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...produced in accordance with original factory specifications to fit waterproof watches with specially constructed and unusual bezels and cases.

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Now you can fit waterproof crystals to specially constructed watches such as:

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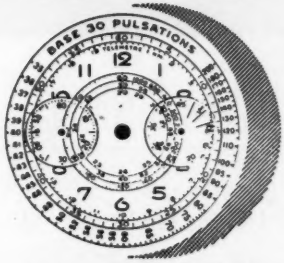

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American
HOROLOGIST
and
JEWELER

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March, 1956

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'cause there's no loop-hole

in the Sandsteel plan!"

The man with the loupe — the watchmaker — has found the Sandsteel plan of providing a chart showing the 100 most popular Sandsteel mainspring numbers a right smart way to *corral* profits. The interchangeability of Sandsteel and Sandalloy numbers — uniquely crosscurved — is another part of the Sandsteel plan to *lasso* customers instead of losing them because your stock is incomplete.

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NOW, FROM THE WATCHMAKERS OF

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You can use this full-color display just as shown here—or better yet, dress it with actual watches in your stock. The central unit measures only 15" by 15". With this display you'll receive two sales aids—booklets on self-winding watches and chronographs—and a 5½" by 4" slogan card (see page opposite).

KERS OF SWITZERLAND—

ING FOR THE MODERN WATCH

This is the fast, sure way to sell a profit-making idea—"Modern watches for modern living"

Now prospects are right outside, right now—walking by your store all day, every day. How do you get their attention and convert interest into new watch sales?

A big part of the answer is right here—the 1956 Special Feature watch display designed for you by The Watchmakers of Switzerland.

This new, full-color display is valuable because it's versatile. You can match the watches you have in stock with the corresponding cards and streamers for a truly effective selling job. You can change this inventory at intervals to give extra life and interest to your window—and bring in extra traffic, too!

Most important—you have an exciting, attention-getting show case for the fine Swiss jeweled-lever watches you carry. Use it to highlight one type of watch for one period of time; then, another type at another time! Or, show all eight of the basic watch types. You can even use the display by itself! These are the ways your customers will get an opportunity to see *all* the miracles that make Switzerland—*the land of time!*

HOW TO ORDER THE 1956 DISPLAY

Soon, you will receive a special order card from The Watchmakers of Switzerland. Simply fill it out and drop it in the mail. (The card is self-addressed and postage-paid.) Your display and extra free material will be sent to you as soon as possible.

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1. **The Swiss Self-Winding Watch**—a unique sales aid that shows your customers exactly how the amazing self-winder *actually* winds.
2. **The Main Types of Chronographs**—another handbook to show customers! It explains the important types and styles of chronographs made by The Watchmakers of Switzerland.

"For the gifts you'll give with pride—let your jeweler be your guide"

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Genuine **Nivaflex**

UNBREAKABLE ALLOY WHITE MAINSPRINGS

have been tested for 10,000* windings without breaking or showing fatigue

**over 28 years in a watch used daily.*

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UNBREAKABLE —
NIVAFLEX is 100% resistant to corrosives, including acid and salt water. Absolutely rustproof.

ANTI-MAGNETIC —
NIVAFLEX is not affected by thunderstorms or sudden temperature changes.

WILL NOT SET —
NIVAFLEX is fatigue-proof — stays at full strength even up to 10,000 windings.

SPECIAL FEATURE!

HR NIVAFLEX mainsprings can be inserted directly into the barrel. No winder is needed. Simply place the retaining ring against the barrel and push spring out.

POPULAR SIZES AVAILABLE!

129 most popular sizes plus 13 Chronograph sizes at $5.75 per dozen, and 13 sizes for Automatics with bridles attached at $6.75 per dozen.

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4. Incabloc jewels — unbreakable balance staff.
5. Unbreakable crystal.
6. Nivarox rustproof — anti-magnetic hairspring.
7. All steel escapement red ruby jewels.
8. High quality radium dial — easily seen at night.
9. Each watch numbered and registered with certificate on waterproof quality and guarantee.
10. Case manufactured in Switzerland—cased and timed in Switzerland and timed again in U.S.A.
11. Newest type of 1956 Scotch plaid strap.
12. Parts all interchangeable.

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404 Fourth Avenue, New York 16, N. Y.
MAKER OF FINE WATCHES SINCE 1878

*as long as crystal is intact, case unopened

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Please send me the Croton "Buccaneer" watch
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There is nothing to compare with the POWER and PERFORMANCE of:

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"as unfailing as time itself"

unbreakable · rust-resistant · anti-magnetic

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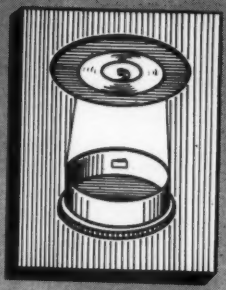

Special BESTFIT "White-A-Loy" "Jiffy-Pak" delivers the spring to you coiled in a special ring for easiest direct insertion into the barrel. No mainspring winder is needed; no necessity to clean or oil the spring. Merely push the spring into the barrel.

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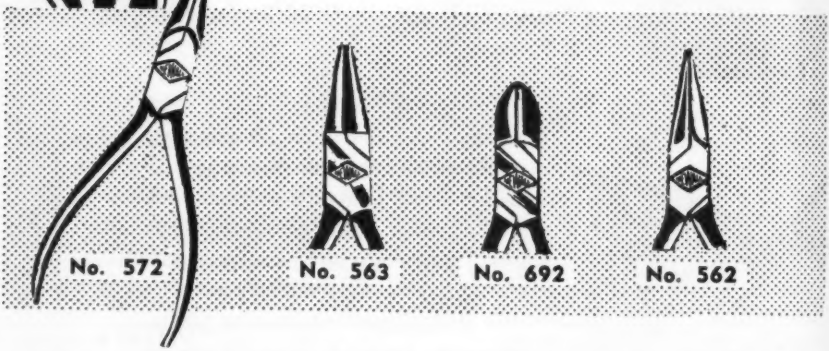

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No. 572	**$1.05**	**No. 692**	**$1.25**
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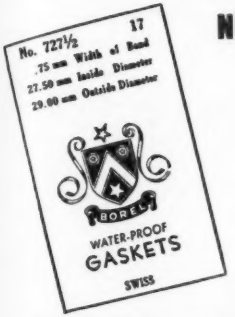
WATER-PROOF with

BOREL Water-Proof Gaskets and Crowns



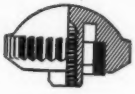
NEW—COMPLETE GASKET ASSORTMENTS

Now, you can use the same top quality water-proof Gaskets used by leading watch manufacturers. Borel's scientifically designed range of 72 different sizes assures a precise Water-Proof fit for virtually every case on the market . . . each packaged and identified for instant selection and re-ordering.

Available from open stock, or in handy economical assortments. Write for free samples and comprehensive chart of sizes available!

Asst. 57/3—3 each of 72 numbers.....$12.75
(Other assortments from $5.95 to $42.50)

HANDSOME, MODERN-DESIGN WATER-PROOF CROWNS



Here are the best looking, finest constructed water-proof crowns you've seen . . . designed specifically for the most popular watches on today's market.

Available in genuine Stainless Steel, or 1/10-14K Yellow, in a variety of styles and taps, you'll find a handy 28-bottle assortment designed precisely for your needs.

What easier way to make certain your repair jobs go out **waterproof!** Write for free sample and detailed information, today.

Asst. 601SY/3—84 Crowns (2 Stainless Steel and 1 Yellow 1/10-14K Crown in each of the 28 opticlear glass vials. Other combinations of colors may be had.....$22.75

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LeCoultre Repair Notes

Calibre No. 489 MEMOVOX Alarm Wristwatch

The numbers in circles, joined to the various parts of the movement by marker lines, indicate the order of assembly. The designation of each part and the number after it correspond to the terms used in the repair trade and to the F. H. Technological Dictionary, where applicable.

Fig. 1

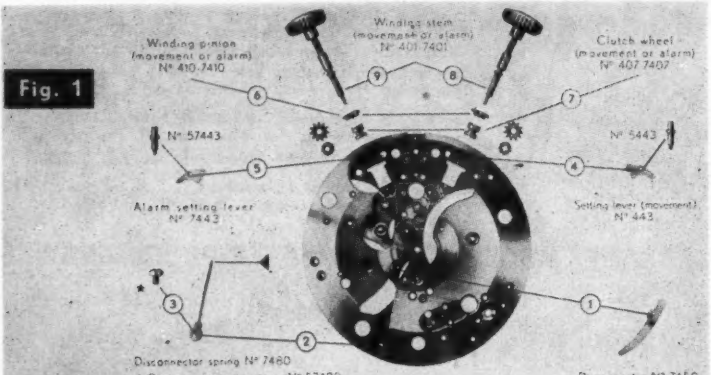
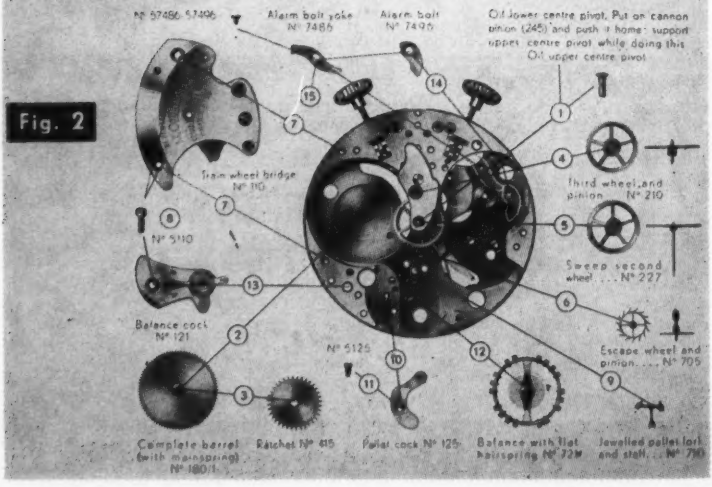

Winding pinion (movement or alarm) N° 410-7410
Winding stem (movement or alarm) N° 401-7401
Clutch wheel (movement or alarm) N° 407-7407
N° 57443
N° 5443
Alarm setting lever N° 7443
Setting lever (movement) N° 443
Disconnector spring N° 7480
★ Disconnector spring screw N° 57480
Disconnector N° 7459
▲ Lubricate here

Fig. 2


N° 57486-57496
Alarm bolt yoke N° 7486
Alarm bolt N° 7496
Oil lower centre pivot. Put on cannon pinion (245) and push it home: support upper centre pivot while doing this
Oil upper centre pivot
Train wheel bridge N° 110
N° 5110
Third wheel and pinion N° 210
Sweep second wheel . . . N° 227
Balance cock N° 121
N° 5125
Escape wheel and pinion . . . N° 705
Complete barrel (with mainspring) N° 1801
Ratchet N° 415
Pallet cock N° 125
Balance with flat hairspring N° 72M
Jewelled pallet fork and staff . . . N° 710

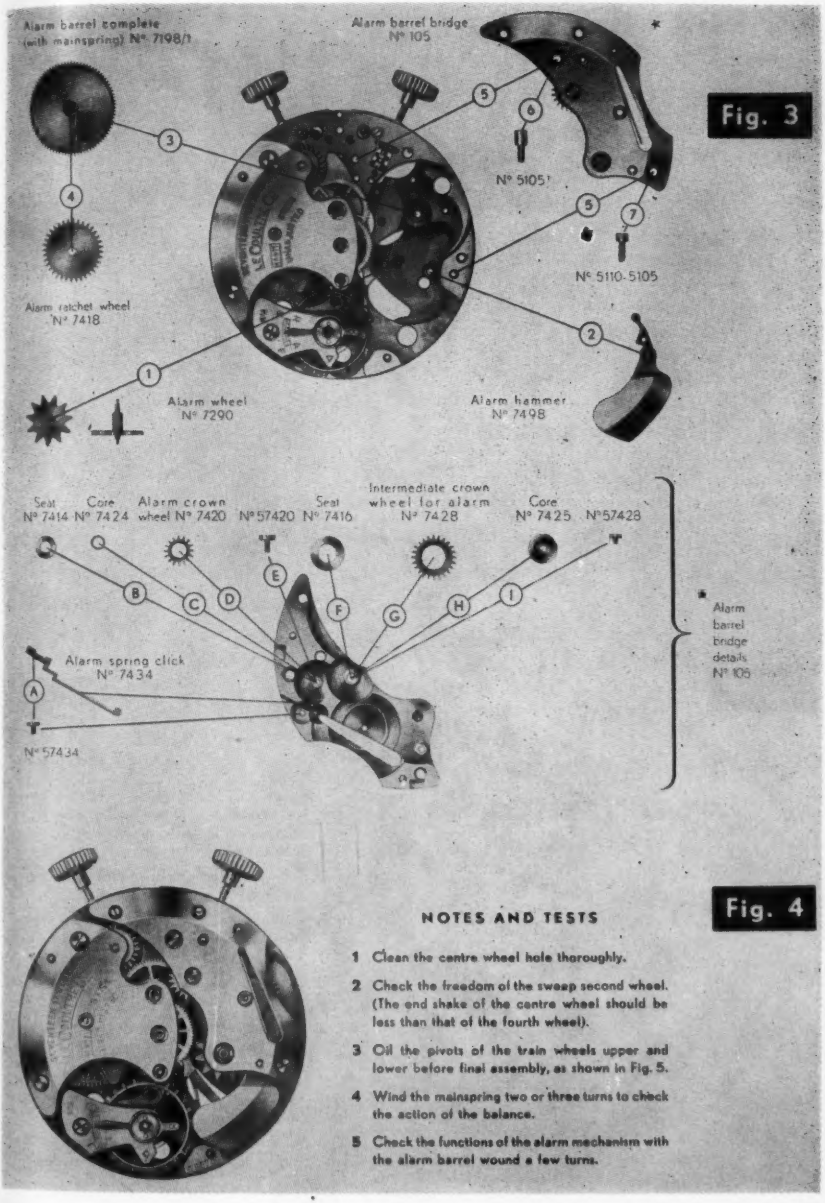

Alarm barrel complete (with mainspring) N° 7198/1
Alarm barrel bridge N° 105
Fig. 3
N° 5105
N° 5110-5105
Alarm ratchet wheel N° 7418
Alarm wheel N° 7290
Alarm hammer N° 7498
Seat N° 7414
Core N° 7424
Alarm crown wheel N° 7420
N°57420
Seat N° 7416
Intermediate crown wheel for alarm N° 7428
Core N° 7425
N°57428
Alarm spring click N° 7434
N° 57434
* Alarm barrel bridge details N° 105
Fig. 4
NOTES AND TESTS
1 Clean the centre wheel hole thoroughly.
2 Check the freedom of the sweep second wheel. (The end shake of the centre wheel should be less than that of the fourth wheel).
3 Oil the pivots of the train wheels upper and lower before final assembly, as shown in Fig. 5.
4 Wind the mainspring two or three turns to check the action of the balance.
5 Check the functions of the alarm mechanism with the alarm barrel wound a few turns.

Fig. 5

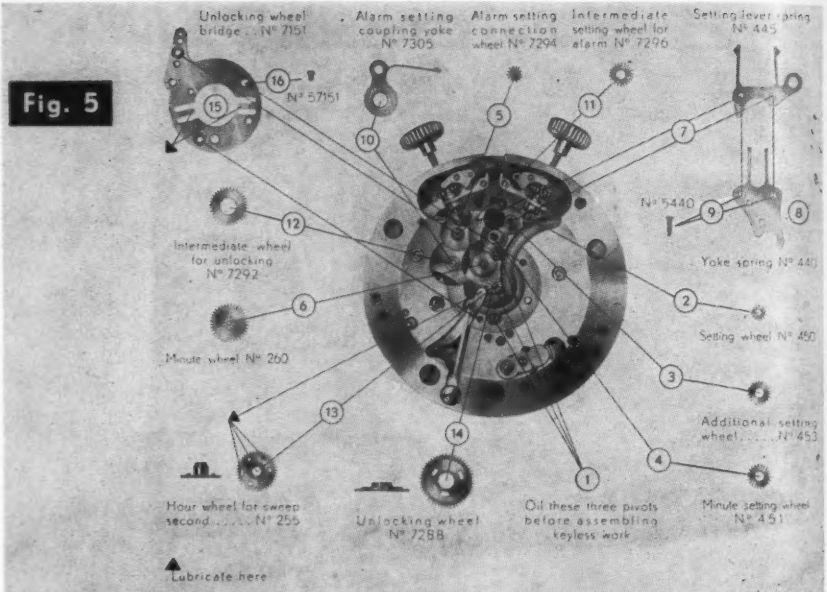

Unlocking wheel bridge . . N° 7151
Alarm setting coupling yoke N° 7305
Alarm setting connection wheel N° 7294
Intermediate setting wheel for alarm N° 7296
Setting lever spring N° 445
N° 57151
N° 5440
Yoke spring N° 440
Intermediate wheel for unlocking N° 7292
Minute wheel N° 260
Setting wheel N° 450
Additional setting wheel . . . . . N° 453
Hour wheel for sweep second . . . . . N° 255
Unlocking wheel N° 7288
Oil these three pivots before assembling keyless work
Minute setting wheel N° 451
Lubricate here

Fig. 6

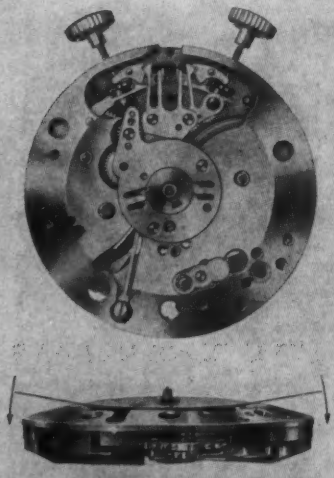


Fig. 6B

NOTES AND TESTS

1 The disconnector spring No. 7480 should lie truly in the middle of its recess to allow it to work over its entire length.

2 The end of the spring which is integral with the alarm setting coupling yoke (No. 7305) should bear against the side of the unlocking wheel bridge. Make sure that this part of the spring does not get **underneath** the unlocking wheel bridge.

3 Pull out the movement winding stem and test the handsetting in both directions.

4 Use the same procedure on the alarm winding stem, and note that it should drive the unlocking wheel in one direction only.

5 Check the silencing of the alarm by pulling out the alarm winding stem while the alarm is ringing.

6 Place the centre dial disc on the unlocking wheel No. 7288. The four catches of the dial hole must correspond with the four notches of the unlocking wheel. When dismantling, the dial must come off easily. If the event of any difficulty, proceed as shown in Fig. 6B.

7 Put the hands on carefully, using a support below the train bridge to prevent it bending.

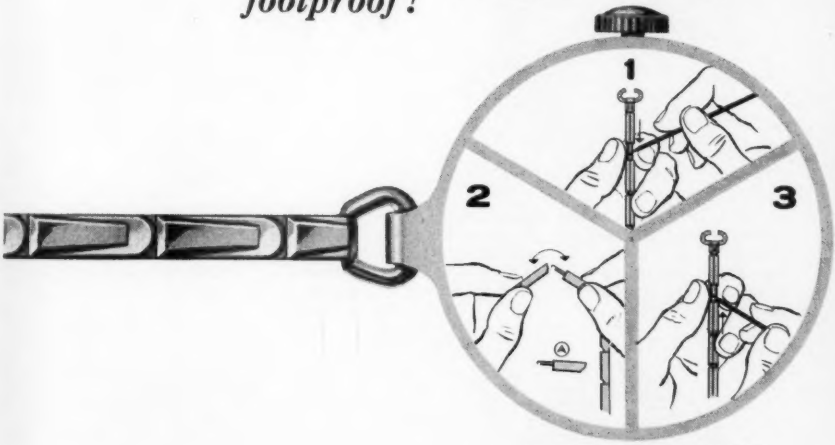
NEW FROM J-B
...and only from J-B

A marvel of ingenuity, the new J-B telescope is fast . . . easy . . . safe . . . secure. An exciting J-B origination, it is unlike any other you've ever seen . . . simple, strong . . . miles and years ahead of anything ever created by any watchband manufacturer!

And what a way to cut inventory! You need stock no shorts, no longs, no in-betweens . . . one size does it. You can custom-fit on the spot . . . speed sales . . . give quicker customer satisfaction. And remember—these bands are not only practical, but exquisitely styled as well!

Don't wait! Call or write your wholesaler now. You'll miss sales if you miss out on the year's most *needed* new development in watchbands!

the first multi-size ladies' telescope band that's absolutely... but absolutely foolproof!



EASY...WATCH!

1. Insert point of tool into hole of link stamped "Multi-Size" and push down, away from end (arrow). Repeat for other links to be removed.
2. Bend links toward arrows to disengage. Link is now removed as in figure A.
3. To reassemble, hook links and push together. Links can now be locked securely. To lock, spread links as in figure 1, insert point of tool and push in direction of end of bracelet (arrow) until slot will click into safety groove.

More news coming from J-B! And for richer profits, remind your customers to "enrich the beauty of your watch with a watchband by J-B!"

JACOBY-BENDER, INC.
Northern Boulevard & 62nd Street
Woodside 77, Long Island, N.Y.

Who Are They?

SHOWN ON THESE PAGES are early photos of ten men, living today, who have achieved national and international reputations for their interest in, and contributions to, Horology. The caption below each photo gives the date of birth of the subject and indicates his activities prior to horological interests.

Can you identify these men? For the first three letters most completely identifying them (to be judged by postmarks on the letters) A.H.&J. will award: 1. A copy of Chamberlain's "It's About Time" (value $35.00); 2. A copy of "Les Automates" (value $22.50); 3. A copy of "The Chronograph" (value $7.50). The principals and members of their families, of course, are not eligible to compete in this contest. Write your answers to: Identity Contest, American Horologist and Jeweler, P. O. Box 7127, Capitol Hill Station, Denver 6, Colorado. The names, present occupations, and accomplishments of the men will be published in next month's issue of the American Horologist and Jeweler.

1. Born 1873. His family rich in tradition of service to royalty. A modelmaker in his youth, he considered himself too light for heavy engineering and turned to horology for a lifetime career of vast service.

2. Born 1922. He was a Western cowpuncher before turning watchmaker. Easy transition from lariats to hairsprings. A natural in precision engineering, he worked on horological treasures.

3. Born 1900. An Ivy Leaguer, he was a fancy diver and learned repertorial writing early. Straight writing not his only style. Clock sleuther.

4. Born 1908. He played trumpet in an orchestra, was a circus acrobat, night-beat police reporter and advertising man. Raises chinchillas.

5. Born 1916. Spent most of his youth in Japan. As a young man in his native country, participated in track and cross-country racing. People ask him questions.

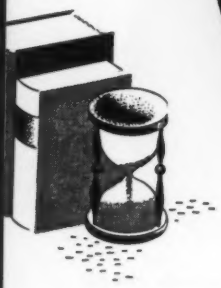
6. Born 1897. Learned his remarkable mechanical skill early in life. While in the Navy, posed for a famous Norman Rockwell patriotic poster. Avid reader and inimitable writer.

7. Born 1907. During his school days, he was an outstanding track star. Entering horology was a natural development for him. Skillful writer, excellent draftsman.

8. Born 1897. His very first interests were music and horology. Repaired his first timepiece when 11, could play all musical instruments and was music director at 18. Vigorous with pen and word.

9. Born 1894. Family distinguished in early American history. Follows profession of forebears handed down through generations. Amateur magician, indefatigable collector.

10. Comes from a long line of horologists. Life-long devotion to his work. Master craftsman, collector. Noted for his keen wit, fun-loving practical pranks. Born 1908.



information PLEASE!

Readers Furnish Answers to Column Inquiries

CO: Years and years ago when wrist watches became so common, I realized the amount of time wasted in making book entries of repair jobs. I realized this all the more when I noted what a small percentage of the wrist watches carried serial numbers.

I evolved the following system for marking cases and for more than 30 years I have not made a single book entry, and what is more, my customers are amazed when I tell them at once what I did to their watches years ago. When I finish a repair job, I scratch on the inside of the back four symbols which tell me all about what I have done to that particular job. For example, if I put a mainspring in a watch today, I would scratch on the case the figures, 216, followed by my private mark. The two stands for a mainspring, the one stands for the month, and the six stands for 1956. I know that this does not mean 1946, by changing my private mark every ten years.

A partial list of numbers is as follows:

1. **Cleaning**
2. **Mainspring**
3. **Balance staff**
4. **Mainspring and cleaning**
5. **Setting bridge**
6. **Crown and stem**
7. **Both upper and lower balance jewels**
8. **Balance staff and cleaning**

When you run out of numbers you can easily invent your own symbol which denotes certain work done on the watch. I have my list all marked down and under a piece of glass on my bench, so that I can refer to it at once. It must be remembered that all the numbers between the first symbol and the year numeral stand for the month of the year. Owing to the fact that there are 12 months in the year, there may be two numerals in between instead of only one. I trust I have made this clear. I would be glad to answer any questions, as I think that over all these years I have all the answers to this method.

• • •

CRE: I have read Horologist and Jeweler for many years, and have found much useful information in its pages. After 50 years at the bench, I find I can still learn much from others.

In the January issue, I notice a Mr. "B.B." asks about keeping records of watch repairs, and agree with him that too much time is wasted in recording repairs, in fact, I shudder to think of the time wasted those 50 years in making book entries for all repairs.

INFORMATION PLEASE

Directed by
W. H. SAMELIUS

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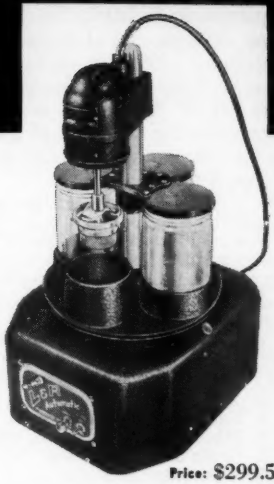

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WATCHWORD OF THE WATCHMAKER

L&R

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For the last ten years I have used a system I devised to save time, and to date, find no fault with it. First I use a trademark that cannot be easily confused with others, then I use a letter designating each part, such as: M—mainspring, LM—lifetime mainspring, S—staff, C—clean, etc.

For example, say I replaced a staff in December, 1955. I would inscribe in the case after my trademark—S 1255, omitting the day of the month, as this is not too important for purposes of guarantees and saves space and time. Other designations of parts may be used.

● ● ●

ERL: Here is my repair numbering and code system:

5 F 1 31 L, for example:
5. Kind of job
F. Month (ABC DEF GHJ KLM)
1. Year (1951) Good for ten years
31. Number of jobs for that month
L. Repairman's or store's initial.

1. **Recorded estimate—not approved!**
2. **Minor repair, crystal, etc.**
3. **Stem and/or crown**
4. **Cleaning**
5. **Cleaning and mainspring (See above example)**
6. **Cleaning and staff**
7. **Cleaning, staff and jewel**
8. **Cleaning, staff, jewel and mainspring.**

If it is desired, a dash (—) can be used after the job code number, such as 5-F 1 31 L, to indicate that there is a deviation in the kind of job code number. After a job has been done two or three years, I have had customers say to me: "It is amazing how you remembered, even to the month, when you repaired my watch."

● ● ●

RL: In your January column came a request for a repair code. This is the one that I have used for years and it is very good, particularly if you do some trade work, and the store wants to see what was done at any given time. If they know your code, they can read the repair items right off.

1. Clean
2. Mainspring and clean
3. Staff and clean
4. Jewel
5. Dial
6. Case repair
7. Crystal

And right on down the line for as many as you care to list.

Now, a watch repaired with a staff and cleaning and a crystal would be marked as follows: 3-7-1 RL. The three and the $\overline{6}$ seven denote repairs, then the numbers one over the other, denote the date, January, 1956. The last is the scratch mark or identifying mark. The only drawback is that if you forget to put in any record, you have none at all unless you keep cash receipts with names and information that can be gone through.

● ● ●

PSS: On page 30 of the January issue of A.H.&J., "BB" asks about a simple system of coding to scratch in the backs of watches that have been repaired. I have been using a system for the past 15 years that has served me well. It is good enough that other repair shops in this vicinity are now using it. It is quite simple and accurate.

Suppose that I had repaired a watch December 23, 1955, by cleaning, replacing staff and jewel, stem and crown. In the back of the watch I would scratch (very small) the following: P-12-2355-1-2-4. This gives my initial, the month, day and year, and the code numbers for the work done. This system obviates the necessity of searching through a book or card index to find a customer's record.

The code, when set up, would look something like this:

1. Cleaning
2. Staff and jewel
3. Staff
4. Jewel
5. Stem and crown
6. Stem
7. Crown
8. Mainspring
9. Plate jewel
10. Crystal

My code at the present time runs well over 100, and can be used on clocks as well as watches. If one does trade work, it is well to prefix the date with the customer's initial and repair tag number for future identification. The repair charges can be shown using the cost code. Like any other system, the code must be used consistently and properly or its value is lost. Hope that this will be of some value to someone looking for a code.

● ● ●

The "Information Please" column wishes to thank Mr. O. Potter of Ellinwood, Kansas, Mr. Samuel Aitken of Patterson, New Jersey, and H.G.W. for their aid in compiling the following list of watches that employ left hand ratchet screws.

When in doubt about whether or not you have a right or left hand screw, consult the list. You may save time, and avoid the misfortune of breaking a screw. "An ounce of prevention is worth a pound of cure."

Bulova	Gruen	A Shield	Benrus	Wittnauer
4 AL	700	748	AE	5 S
5 AB	701	340	AF	5 W
5 AC	702	341	LQU	
5 AL	703	554		
5 B	704	1001		
5 BB	705	1002		
6 AL		962		
7 AD	Westfield	964	Helvetia	Beguelin
7 ADC		970		
10 AL	7 WM	976	800 C	51
7 AF	7 AW	1012		
	10 B	723		
	10 WGZ	589		
	10 WZ	624		
		984		
		1023		
		427		
		574		
		748		
		1051		

HGH: So much has been said about condensation under crystals, and it is so easy to stop. Obtain a "No-Mist" cloth (two for 50 cents) from any material jobber. Simply breathe on the inside of the crystal after it is installed and wipe with a cloth. Then, try to see if you can make it steam up again. The moisture may be there, but it will not form on the crystal. It's the same treatment that you give your glasses.

Reducing balance weight

BP: We have a difference of opinion as to the proper way or method to reduce weight from a balance screw when poising a balance wheel. Will you tell us of the different ways to do this and which way is proper?

Answer: Some of the methods are: When removing weight—undercut by using a hollow rose cutter of proper size to fit around the thread, and undercut a groove into the head of the screw, cutting the screw slot wider or deeper with a screwhead file or screw slot saw, or sometimes

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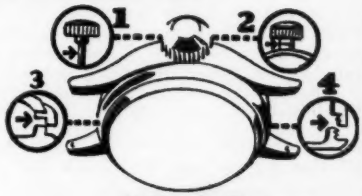

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chamfering the edge of the slot (this is not recommended as it spoils the appearance of the screwhead), countersinking the head of a slotless screw with a fine-toothed countersink; under-cutting the head; chucking the screw in lathe and using a fine pointed groover.

Polishing the top of the screw in the lathe or with a screw head polisher, reducing the diameter of the screw, or shortening the screw with a stripping tool are other methods. If the removal of material has been excessive, then add weight by means of a timing washer. The timing washers must be of the same diameter as the balance screwhead. Before attempting to poise the balance, make certain that the balance pivots are straight and round—no burrs on ends of pivots—and that the poising tool jaws are parallel and clean.

Let the pivots rest on the knife edge. If the jaws are too close, so that the cone of pivots ride the knife edge, accurate poising cannot be accomplished. A safety razor blade with cutting edge nicked will remove material from the bottom of the screw slot.

Shortening position tests

IRS: I have recently secured a position with a railroad watch inspector who insists that all watches be adjusted to position, and tested 24 hours in each position. This delays the work and necessitates the use of a large number of loaners which are being constantly carried by our men. At times, we are short of loaners and sometimes we have had to give out new watches.

What I would like to know is whether there is not some way of shortening the tests, and whether there is a quick way of bringing the various positions within the time limit.

Answer: Watch adjusters in small shops call the dial-up and dial-down the end positions, because then the balance is running on the ends of the pivots on which it rests. When they desire to make a quick adjustment, after carefully truing and poising the balance and pinning the hairspring, they take out the pallets and when the balance is at rest, they turn it exactly half a turn (which can be readily done by noticing the position of the arms) then release it and see how long it will run dial-up. We will say it runs three minutes and 20 seconds before coming to a dead stop. Write this down.

Turn the watch over. Give the balance a half turn as before and again note the time. We will assume that at the second position it ran only one minute and 15 seconds. Of course, it is evident that such a watch can never be brought to time in positions until this difference of friction is found and removed. It may be difference in the size of the pivots, a difference in the shapes of the ends, or an end stone may be pitted. A very small pit in an end stone is sufficient to make such a difference.

After the pit is found and polished out, and it is reasonably certain that the pivots are long enough to run on the ends instead of the cones, make the test again, and if the balance runs within five seconds as long in one position as in the other, you may be sure that the two end positions will give you no further trouble in adjusting.

The next thing is to test the watch pendant-up. Put back the pallets, wind half way and try the rates dial-up, dial-down, and pendant-up. We will say that pendant-up, the watch loses over the end positions six or seven seconds. In that case, the pins are too wide and must be closed to where there is barely perceptible motion of the hairspring between the pins seen with a double glass.

If the pendant-up position shows a gain of six or seven seconds over the end positions, and no motion of the hairspring can be seen between the pins, they should be opened an extremely small amount, to where motion is barely perceptible with a double glass. This will slow the watch. It is possible in this way for an experienced man to thus bring his three principal position errors within limits in half an hour instead of taking three days. Pendant-right and pendant-left positions depend chiefly on errors of banking and hairspring pinning, unless one position shows an error vastly greater than all the others combined. Then, an individual cause must be looked for.

Common errors are lack of balance of fork and pallets; a rough place on the side of the jewel hole which does not come into play in the other positions; one bank-

ing pin set closer to the line of centers than the other; and various other trifles which interfere with perfection.

If you will go through your watches in this manner, in assembling them, you will soon be able to greatly reduce the time of rating, and in many instances will come within the limits the first time trying. But, after you have accomplished this, do not imagine that you are a complete adjuster and that there is nothing to it, because about that time you will find a watch that will baffle you for two weeks. "Whom the Lord loveth, He chasteneth, and the Lord loveth a Watch Inspector." Why not interest your employer in purchasing a timing machine? So much time can be saved this way that the machine will pay for itself in a very short time.

Tube length

CWB: Will you let me know how long a brass tube must be to hold three pounds of lead? The brass tube is to be one inch in diameter.

Answer: A round tube one inch in diameter and one inch long contains 1.76 cubic inches. One cubic inch of lead weighs .41 pound.

1.76x.41= .72 pound per inch

3÷.72=4.16 inch length of brass tube

Automatic best timekeeper

CCB: Can you give us some talking points in favor of the self-winding watch? Which is the better timepiece?

Answer: Generally speaking, I believe you will find the automatic wind shows the best time. The self winding watch is being wound continuously so that the power source is constant and evenly spent. That is one reason we may expect more constant time. In other words, the balance motion is the same throughout all the jars and various positions the watch is subjected to during the day or service hours. All agree that the manually wound watch should be wound at regular periods, preferably when arising. This is good advice, but it is not always carried out.

The self winding watch has an arrangement which prevents over winding the mainspring. The manual wind watch is wound up almost tightly, which in turn,

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has some effect towards isochronism. Should the manually wound watch be encased in a waterproof case, the constant winding each day would soon wear away the water resistant gasket under the crown, and thus the watch would not remain waterproof for long.

In a self winding watch, the crown is seldom used, except to adjust the hands, which does not appreciably wear the gaskets. The self winding watches are more complicated than the manual winding watch, as most all have a dual arrangement which permits manual winding in addition to automatic winding. This automatic section has many parts that naturally will require up-keep and in turn, higher repair or cleaning bills.

While the early models were large and thick, the new model self-winders are small and thin and much to be desired. I do not mean to say that the manual watches are not good timepieces, as many of our finest and highest priced wrist watches are manual winds, but when it comes to the average run of wrist watches, I believe that the auto-wind will give the best results as an all around timepiece.

Of course, the convenience of not winding it each day is a selling point. Our late models have ample reserve power to carry over and keep the watch running for many hours after being removed from the wrist, another feature for its preference over the manual wind.

Length of clock weights

CW: I am called on to furnish two weights for a grandfather clock by suspending a small pail on each train. I find it requires six pounds, and eight pounds to run the time side and strike side. I want to make these weights from solid round bars that I can obtain here in our scrap yard. I can get the stock in 1½", 2" and 2½" diameters, and when plated, it should make a good looking weight, much cheaper than a brass weight. Will you tell me how long these weights must be?

Answer: From the machinists handbook, we learn the following information:

1½" round stock weighs 5.99 lbs. per ft.
2 " round stock weighs 10.65 lbs. per ft.
2½" round stock weighs 10.66 lbs. per ft.

From these figures you can easily decide what length stock is required by simple proportions. If you use the 2" diameter stock, a length of 7.1′ will weigh eight pounds. A length of 5.32′ will weigh six pounds.

Selecting new hairspring

HS: How can I select a new hairspring with the old one at hand as a sample? When there is no sample? Sometimes the old spring is all pulled out of shape, or it isn't there at all.

Answer: The old spring, if you have it, may give you some idea of the number and closeness of the coils to look for in the selection of a new one. If you have the collet from the old spring, of course you will fit the new spring to it. The diameter of the new spring is decided from the relation of regulator pins and balance center, if you are fitting a flat spring, and the strength by vibrating or counting.

Most of our watches today have an 18,000 train. The balance makes five vibrations per second and 300 vibrations per minute. However, we do find small models that vibrate more than five per second and some of our early models vibrate less than five beats per second. The only rule that will be safe in all cases is to first determine the number of teeth in the center wheel, third wheel, fourth wheel and escape wheel. Multiply together, and then by two, as each tooth in the escape wheel gives two impulses.

Then, divide by the number of leaves in the third, fourth and escape pinions multiplied together. The result will be the number of vibrations required per hour. When the watch has a second hand, and the fourth wheel revolves once a minute, you can figure the number of vibrations more quickly by multiplying together the number of teeth in the fourth wheel and escape wheel, doubling the product, and dividing by the number of leaves in the escape pinion. This will give you vibrations per minute.

To gauge the size of the spring, lay the balance bridge upside down on the bench with the regulator on. Place the spring on the bridge with the center of the spring exactly over the center of the balance hole jewel. The coil that would naturally fall between the regulator pins marks the limit

of diameter for the new spring. Mark the point where the stud would come on this coil with a touch of rouge. Always choose a spring a trifle smaller in diameter rather than a bit larger. For overcoil springs, the diameter of the spring can be one-half the diameter of the balance. The strength of the spring must now be determined. Experience is an aid to quick selection, but "vibrating" under conditions as nearly as possible like those in the movement, must settle the point. Pass the center of the spring over the balance staff. Put the collet on and gently press down until it just grips the central part of the spring. If the collet is missing, a touch of beeswax will serve to hold the spring. For counting, lay the watch you know is keeping accurate time on the bench. Rest the right hand on the bench so that it can be held steadily without fatigue. Catch the spring with tweezers at the point marked, on what would be the outer coil. Then with the left hand, wind up the balance and spring about three quarters turn and set it vibrating with the lower pivot of the staff just resting on the watch glass. Don't try to count every vibration.

When the motion of the balance has so far steadied that you can follow it easily, start counting "one, one, one" a few seconds before the second hand reaches your starting point. Then you are ready to begin counting the instant the hand reaches that point. At that point, you start counting by, say—zero, and then make the regular count, starting with one. Count only the alternate vibrations, either to the right or to the left, and count for 30 seconds. If by that time, the count is too great or too small, the spring will not do.

If you are selecting a spring for an 18,000 beat watch, you should have 75 double vibrations for a 30 second count. Continue the count for a full minute, then repeat the count to be sure that you made no mistake. Remember unless your counting is right (and it takes practice to count a spring surely every time) all your work

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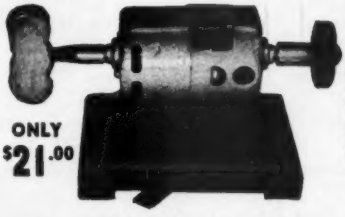

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in selecting and fitting a spring may be lost. Remember also that it is better for the spring to count a half vibration less than the required number, than a half vibration more, for usually the spring will be a little faster when finally fitted to the collet.

Watch stops after cleaning

WC: Quite often after cleaning a watch, it stops, and I am wondering what I have done to the watch to cause it to stop so shortly after assembling. I am a beginner and will appreciate any suggestions you may offer that will be helpful to me in locating the trouble. No doubt there are other young watchmakers who will appreciate some help also.

Answer: From the tone of your letter, I take it that you are rather new in the trade and lacking experience or the knowledge of what makes a watch run, or what can stop a watch after cleaning. You ask what you are doing wrong to get you in so much trouble over a simple cleaning job. The trouble could be one of many reasons, and perhaps be attributed to your method of cleaning or assembling the watch. To state just what may be wrong without having the watch at hand to examine cannot be done. So, the next best way will be to suggest what you may check over to find the trouble.

Let us start with the barrel. Could you have the cover reversed or perhaps positioned improperly, so that the barrel runs out of flat or binds between plates, or rubs on center wheel? Perhaps the center wheel may have been damaged and out of flat, or the jewels shifted so that there is too much end shake, or no end shake, causing a tight center pinion. It could be that some of the train pivots were bent or damaged on assembly by using too much pressure when locating pivots in the jewels, or perhaps some hole jewel is cracked or checked.

It could be that the pallet stones or roller jewels have become loose and shifted, because of laying in the cleaning solution too long. Perhaps you got the balance hole jewels mixed or replaced wrong—maybe upside down. Your hairspring may be out of flat and striking the under side of the regulator. There may be too much end shake for the pallet arbor, or you may find the cannon pinion is rubbing or binding on the surface of the plate and that the hour wheel is tight over the cannon pinion.

Perhaps the dial is pressing down on the hour wheel, or off center, so that it rests against the hour wheel and binding. It could also happen that a train bridge or balance bridge was not properly secured, and when setting the movement into the case, tightening the case screws might cause the bridge to shift and tighten up some end shake, causing a stoppage.

A minute hand pressed down on the hour wheel or the hour hand may cause a stoppage, or a loose dial can do the same thing. A minute hand rubbing the dial or reflector of bezel; neglecting to lubricate mainspring, a clutch spring that does not function properly, allowing clutch to come in mesh with the intersecting wheel or minute wheel, or a binding of a minute wheel; neglecting to properly lubricate the train or escapement; these things can all cause difficulty.

Then, if you dried the parts in sawdust, it is possible that a piece of sawdust might have become lodged in a pinion or between some wheel teeth. After checking over these possibilities for stopping a watch after cleaning, I believe that you will find the source of your trouble.

Thomas Mudge story

CB: In our shop we have an English watchmaker, and all we hear about is English watchmakers and Thomas Mudge. Will you give us some facts about Thomas Mudge?

Answer: Thomas Mudge was born at Essex, England, in 1715. He served his watchmaking apprenticeship under "Honest" John Graham, a famous English watchmaker. After Graham's death in 1751, Mudge opened up his own shop in Fleet Street, London. He invented the detached lever escapement, which he introduced in his famous Queen Charlotte watch about 1757.

Mudge's detached lever escapement, in principle, is used in today's jeweled lever watches. He contributed to perfecting watches. Mudge was the first to introduce jewel pallet stones and roller jewels into

watches. He contributed to perfecting the marine chronometer, and was awarded 3,000 pounds by the English House of Commons. He was watchmaker to the Court of King George III. Thomas Mudge died in 1794.

Welded vs. riveted brace

MPS: Is there any advantage in a welded brace in comparison with a riveted brace end mainspring?

Answer: From tests made to pull brace from spring (for a 15/0 mainspring): load required to pull brace from welded spring, 18.9 pounds, while for the riveted end, it only required a load pull of 9.7 pounds. So you see the welded end is much stronger than the riveted end.

Cap jewels same thickness

KC: In the Bulova Hinged Shock Resistor, I find two cap jewels. Which is the thicker—the upper or lower jewel?

Answer: We learn that both cap jewels are of the same thickness, so no harm or trouble can occur in case they become mixed. Perhaps at some time someone has had to replace a cap jewel that was not genuine, thus causing confusion.

Invar metal source

IE:Where is Invar metal made, such as is used for monometallic balances and hairsprings? Is it a secret known only to Europeans?

Answer: Invar is not used for balance wheels or hairsprings. Invar is used mostly in horology for pendulum rods of very accurate clocks used in astronomy and other scientific work. Elinvar metal is to some extent still imported. The use of the trade name in the U.S.A. is licensed to the Hamilton Watch Company of Lancaster, Pennsylvania.

Most of the alloy metal used by that firm for hairsprings now, is made in their own factory from a formula of their own, yielding metal much superior in quality to that imported from Europe. Monometallic balances are made of non-ferrous alloy metals of the nature of brass, bronze, etc., and never of alloys of iron or steel such as Invar or Elinvar.

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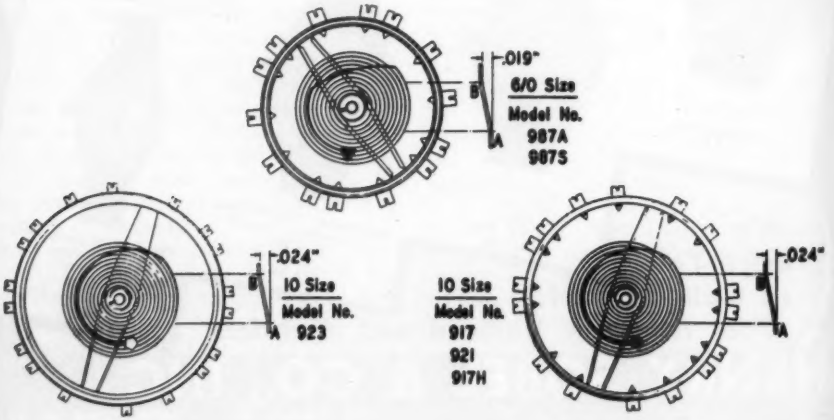
OVERCOILING HAMILTON HAIRSPRINGS

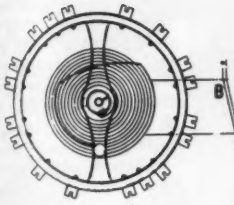
■ WHEN necessary to adjust the overcoil on a Hamilton Watch hairspring, or to reform it to correct shape, the drawings on this and the opposite page will provide an accurate guide for each model.

To form an overcoil, bend spring upward from raising point (A) to create necessary offset as indicated. Between raising point (A) and first bend of overcoil (B), the raised portion must continue as a spiral and not deviate inward or outward. Make raised coil beyond (B) parallel to main body of spring. Shape the overcoil between (B) and the stud, working toward the stud. With balance at rest, the overcoil should lie between the regulator pins, so that the regulator may be moved to both extremes without the hairspring bearing upon either pin.

A hairspring which is out of level in the flat may drag on the balance arm or balance cock, causing the watch to stop or run erratically. If the hairspring is out of center, the motion of the balance will be non-isochronal. Unless the hairspring is badly bent, corrections for both of these faults may be made by giving attention to the overcoil. Proper overcoil shapes are shown in the drawings.

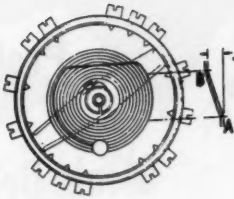
The most frequent cause of hairspring distortion is handling during the cleaning process. Whatever the cause, a return to the proper shape (as indicated in the drawing for the model concerned) will correct formal error on hairsprings for Hamilton Watches.





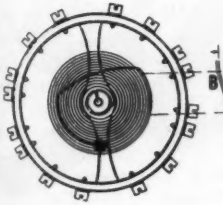
8/0 Size

Model No.
730
735
747
748



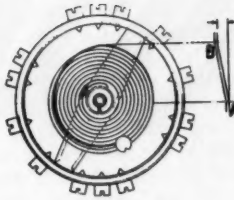
20/0 Size

Model No.
995A
997



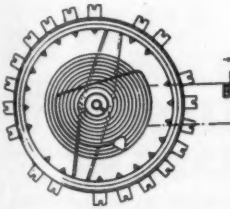
12/0 Size

Model No.
752
753
754
770



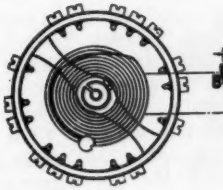
21/0 Size

Model No.
721



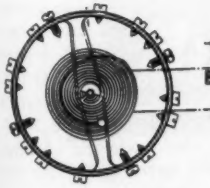
14/0 Size

Model No.
980
980A
980B
980H
980W
982
982M



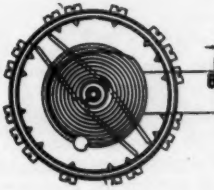
21/0 Size

Model No.
750
751
756
757



16 Size

Model No.
950B
992B
998B
999B
4992B



22/0 Size

Model No.
911
911M

CLOCKWISE and Otherwise

By J. E. COLEMAN

Mr. Coleman invites your questions. If your question requires a direct answer, please enclose a self-addressed, stamped envelope. It is impossible through correspondence to give valuations of antique time-pieces; questions of this nature cannot be answered accurately.

Problems of Clock Deluges

WRITING of the 400-day clock in the October issue lead article of A.H.&J., Dr. Atlantis Sudbury said: "Many of these clocks have been injured by the owners when setting them up incorrectly, and stand motionless in their homes because the owners are unable to find anyone to repair them." Further on he says: "In my estimation this is the worst deal that we proclaiming horologists have handed the public in the 50 years that I have been associated with this business."

In the main, the good Doctor was correct, he just was not familiar with the work of Charles Terwilliger, the "Horolovar 400-Day Clock Repair Guide" and the Horolovar suspension spring system. Naturally, we wrote him, and he said he had not seen it. (The Column mailed him a copy). So, taking into consideration that Mr. Terwilliger has made available to the bench repairman materials and instructions for these pesky critters, the picture isn't quite so bad.

Actually, that is beside the point. What Dr. Sudbury was referring to was the flood of 400-day clocks that have hit this country since World War II, and pointing out that the bench mechanic was not equipped to cope with it.

As we look upon clock history and the importation of clocks, there have been three floods or waves of them. The first wave was that brought by Joseph Napoleon (brother of Bonaparte) when he fled France after the battle of Waterloo and settled in Bordertown, New Jersey. Fortunately all of these seem to be a fair grade of French pieces and pose no special repair problems. The second deluge was of 400-day clocks, referred to by Dr. Sudbury. The third is the current wave of cuckoo clocks, which if it continues, bids fair to equal the second.

Unfortunately for the repairman, not much has been done in the way of solving his cuckoo repair problems. We firmly believe that if Dr. Sudbury were to take one of those little musical cuckoo clocks (three-weights) to five shops as he did the 400-day, he would meet five just as emphatic refusals to repair them. Whether there are as many makes of cuckoo clocks as 400-day, I am not sure, but would not be surprised to find that there are more—at least more variations.

It is doubtful whether or not a manual can be produced comparable to Terwilliger's 400-day Horolovar manual, because cuckoo clock plates are not marked. Furthermore, a great deal of cuckoo work consists of adjustment, bushing, re-pivoting, etc.—all basic. To put into practical words where to make and where not to make adjustments is difficult. With those little musicals, it becomes even more complex. Right now, the number one headache is chain wheels. Seems every day brings up a new type of movement with different chain wheels.

For a number of weeks this problem

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has been receiving serious consideration. We hope to make an announcement in the next column or two that will solve the greater part of your cuckoo clock problems.

* * *

In one of his editorials in a recent edition of the British Horological Journal, Editor Eric M. Bruton had this to say: "Success of the repairer (even the trade repairer) and the retailer depends ultimately on his good relations with the public. Gallup poll already referred to in these pages showed that public confidence in the watch and clock maker was extremely low—lower even that its confidence in garage and radio shops."

On former occasions, this column has made the comparison between the U. S. horologist and his counterpart in the United Kingdom. Naturally, we got to wondering how the public of one country would compare with the other. Then came the thought that maybe Dr. Gallup could be working on a similar poll here. As always, believing the best place to get information to be GHQ, we phoned the American Insitute of Public Opinion in Princeton, New Jersey, and had a nice talk with a Mr. Ruby who helps Dr. Gallup run these polls. He was not familiar with the details of the British poll, but said no similar poll has been tried here and did not think that one was included in present planning. Then, almost as an afterthought, he added, "That's an idea."

In addition to stressing cooperation, we've had a good deal to say from time to time about "public relations." Along the cooperative theme, we have urged bench repairmen to unite (cooperate) with our national and state organizations in the concerted effort toward a better understanding between the repairer and the repair purchasing public. If Dr. Gallup should decide to sample our nation's confidence in its horologists, I fear the results would fall short of what I'd like it to show.

We remember quite well an article of some dozen or 15 years ago, when one of the popular magazines ran an article entitled "The Watchmaker Will Get You If You Don't Watch Out." I resented it at the time and that resentment has grown over the years. Just because one rotten apple may be in the barrel is not proof that all the apples are rotten.

* * *

Mail this month, good. Mr. W. C. Snodgrass writes:

Dear Mr. Coleman:

Here is a news item clipped from our local paper. I wonder if it appeared in the paper you read. It sounds like the "poor Danish watchmaker" did all right. The other clipping about Ohio clockmakers, I have had for quite a while, but never got around to sending it to you. It is probably old stuff to you, but I thought you might be interested.

Some time ago, I read in your column about a large Howard jeweled sidereal clock which someone had in his possession. I have been taking care of one here at the Wittenburg College Observatory. A sidereal clock—it has gravity escapement with jeweled gravity arms and pallet jewels. It also is a Howard and is in a mahogany case about five and one-half feet tall.

I enjoy your column very much. I attended the American Horological Convention number two in Cincinnati and quite a few others after that. My membership card was No. 72, so you can see I have been interested a long time. However, our guild fizzled out years ago, and since then I have just been a magazine subscriber.

I thank you for the help you have given us all through your column. Best wishes to you and Jan.

WM. C SNODGRASS
721 No. Fountain Avenue
Springfield, Ohio

We believe that it was Mr. Paul Blanchat, 316 All Hallows Road, Wichita 1, Kansas, who had the Howard gravity escapement regulator and suspect that he would be keenly interested in a complete description of the Wittenburg clock and its rate. We appreciate the clippings a lot. A number of readers have mentioned the Copenhagen clock. Mr. James Sorenson has cooperated by sending us a detailed, eye-witness description of this clock:

Dear Mr. Coleman:

I am writing to you in regard to the Copenhagen Courthouse clock. I inquired

about it last summer, but you did not have any information available at that time.

Last July I took a two-month trip to Europe and visited Copenhagen with a view to finding out about the clock. The clock is the most accurate in the world. The prediction is that it will only vary one-eighth of a second in 300 years, and is expected to run steadily for 1,000 years, and if properly cared for, will accurately calculate the positions of the stars in the universe for the next 25,700 years.

The clock is housed in an airtight, humidity and temperature controlled, glass case and can be seen in a tower room, open to visitors, in the Copenhagen Courthouse. Its overall dimensions are: nine feet long, six feet high, and two and one-half feet wide. There are 445 cog wheels and 15,000 parts in all. One of the wheels has such a slow motion that it will take over 25,000 years for that wheel to make one revolution. Above the tower room housing the clock is another room, and in this room are two cases—one containing the chimes of the clock, and the other, the function of the time of the clock. The King of Denmark started the clock running December 15, 1955, by pushing a button.

When I visited Copenhagen, the clock was not finished. At that time, the chime was working and the clock was running on the top floor, but the calendar, astronomical, and other parts of the clock, had not been completed.

Jens Olsen, the inventor of the clock, died in 1945 and did not see his clock finished, but all his drawings were complete so Professor Otto Mortensen of the Copenhagen Astronomical Observatory and his associates completed this clock. Olsen was by trade a locksmith and taught himself astronomy, physics and engineering. After a trip to Strasbourg, Germany, to see the famed astronomical clock there, he conceived the idea of an even more accurate clock.

First Olsen built an astronomical workshop in the basement of his home—as complete as his savings would allow. At that time, he had had a few inventions patented which he sold, so he would be able to build an astronomical observatory outside the city. Up to this point, he had no help from the state, but in the early

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twenties, he started to submit his work to the best astronomical and technical authorities in Denmark. In 1928, Professor Elis Stromgren of the Copenhagen Astronomical Observatory declared Olsen's clock to be both astronomically and mechanically correct and sound of function. After that he received great support from his fellow craftsmen and the clockmakers' societies raised funds to finish the clock.

Olsen designed the clock to give the complete motions of all planets and stars, eclipses of the sun and moon, rising and setting time of all stars, Central European time, sidereal time, local Copenhagen time, sunrise and sunset by sidereal time, and true solar times. The clock shows the correct time any place in the world at all times of the year.

A special face shows the complete calendar of days, weeks, months, years, by Gregorian calendar, the Julian day and year, and the phases of the moon. Another face shows all church feasts, which at the beginning of each year records the coming year's feast days after the calendar mechanism has gone through 570,000 different functions in six minutes. There are ten faces on the clock, each face showing a different function, and eleven sets of coordinated works moved by weights.

I tried to find out how the clock could keep as accurate time as has been predicted, but no information could be given. The rotation of the earth around its axis is the only thing we have that gives such accurate time, so I assume that it must be taken from that; as the earth goes by the stars, it could automatically be taken from that to set the clock.

From Copenhagen, I visited Switzerland and toured three watch factories. Thanks to the firm I have been with for many years, S. Jacobs and Company of Minneapolis, I was introduced and kindly received there. I visited Longines-Wittnauer, Vasheron & Constantin, and Omega. I was rather surprised to see the excellent automatic machines the Swiss factories have.

In the very old Vacheron & Constantin factory, which makes only 18 karat gold watches, many of the parts are still made by hand, something like watchmakers in our own shops in the United States. Vacheron & Constantin was celebrating its 200th anniversary and had on exhibit a model of each of the watches they have manufactured during that time, plus all the types of tools that have been used. It was very interesting to see the improvements that have been made.

JAMES L. K. SORENSEN
1323 West 50th Street
Minneapolis, Minnesota

Mr. Sorensen enclosed a cut of the clock and I regret that we cannot use it. Editor Martin tells me that it is coarse grain and not practical on this type of paper stock.

Mr. W. Preuss, from up in Montreal, Quebec, writes regarding the reference in the January issue to "Grossman":

Dear Mr. Coleman:

You mention in the January issue, the Grossmans' lesson in Horology. This led me to discover that there were at least three of them prominent, and I believe that you refer to the father and son team of Switzerland, whereas the K. M. Grossman was quite a linguist, and I think an honorary member of the British Horological Society.

Oh well, it is just a minor point, but I am quite sure that you referred to the writings of Jules Grossman, a former professor at a technical school in Le Locle, Switzerland.

I look forward to your next issue with impatience, since it provides me with a needed break from my mending tasks.

W. PREUSS
4092 Weimer Avenue
Montreal, Quebec, Canada

He is correct. The two Grossmans who wrote and produced the lessons referred to, were a father and son team. Jules Grossman, the father, was born in Eberswalde (near Berlin), Germany, July 28, 1829. Hermann, the son, was born in Locle, Switzerland, April 4, 1863. It was at the insistence of the Swiss Government that Mr. Grossman and his son undertook the compilation of the treaties "Lessons in Horology" about the turn of the century. Jules Grossman was one of the founders and at the time of writing the treatise was director of the famous horological school of Locle. At that time, Hermann Grossman was director of the Horological and Electro-Mechanical school of Neuchatel, Switzerland.

The third Grossman that Mr. Preuss has located, was Karl Moritz Grossman. He was three years older than Jules, having been born in Dresden, Germany, March 27, 1826. I suspect that Mr. Preuss is correct in saying he was a member of the British Horological Society, though I don't recall seeing it. Mr. Grossman spent about a year in London along about 1852 and it was in 1865 that he was notified that he was the winner of a prize offered by the British Horological Society for writing a treatise on the lever escapement.

He was a prolific writer contributing to the American Horological Journal and the British Horological Journal, as well as to the Swiss and French journals. The late Mr. George Gruen of Cincinnati was a pupil of K. M. Grossman, and another of his pupils, a Mr. Boude, retired since World War II and now very near the 100-year mark, is still living in Louisville, Kentucky.

* * *

One of these days, we shall be asking Mr. John Smith in which column certain points were recorded, for it seems that his system of indexing may be better than my own. Ours is a card system—and they are forever getting mixed. It pleases us to know that he thinks enough of A.H.&J. to make up and use an index.

I am sure that Mr. Hardy, Mr. Samelius and GHQ at Denver will agree with me.

Dear Mr. Coleman:

Having just returned from a tour of duty in the Far East, I have dropped far behind in my reading of C & O, but am now in the process of catching up. I am writing these lines in reference to a letter from Mr. James W. Wilson in the March, 1955, edition. I intend to expand my interest in clock repair upon leaving the Naval Service on retirement in the next year, and I have been compiling an index on all the C & O items of any interest to the business of clock repair, or historical data.

This index of mine dates back to the January, 1949 issue and at present I am eight months in the red, but will be soon caught up. This index consists of a ledger type book with a full page devoted to each monthly edition, and in it I enter all items of interest from the magazine such as new tools, sources for parts, historical information, chronic clock ailments, repair hints, and any address you may include that may come in handy later on.

I merely classify the entry as to the section it is taken from—such as C & O or Information Please, and the subject covered, and then add the page number. Instead of looking through the whole file, I go to the index book and find the month and page of all items covering this subject, as there are many duplicate entries, and then pull these editions from the rack.

A man devoting his work day to the business of watch and clock repair may not find this system too valuable if it eats into his work day, but I have found it very handy, and usually enter all entries as soon as I receive my copy of A.H.&J. With the new system of heading all C & O discussions since January of 1955, I find it much easier to keep up my log even before I study the complete substance of the discussion.

Thank you for all your past services. I wish you best of luck and much more cooperation in the future.

JOHN M. SMITH, ADC, USN
Attack Squadron 72
Naval Air Station
Quonset Point, Rhode Island

We shall be with you again next month with some announcements and continuing the plea for more and better cooperation.

Tiffany Never-Wind query

Dear Mr. Coleman:

Could you give me any information on the Tiffany Never-Wind Clock Corporation battery clock? Customer has one that needs batteries. Are there batteries available?

Can't give you model number, but at first glance, the clock resembles the present 400-day clocks. It carries the batteries in the base. G. H. COOPER
Aledo, Illinois

Dear Mr. Cooper:

The Tiffany Never-Wind battery clock was patented by Mr. George S. Tiffany of Summit, New Jersey, about 1902. It was first announced to the trade in the November, 1904, issue of the "Keystone." It is said that Mr. Tiffany first conceived this method of operation about 1900. There followed another patent on March 8, 1904.

First the Company was located at Summit. In some way it got up to Buffalo, New York, where the clock was produced under several trade names by the Niagara Clock Company. A few names were "Cloister, Niagara, Tiffany" and "National," the latter being used when the Company name was changed to the National Magnetic Clock Company.

They were having financial difficulties in 1929 when a group of people in Dunkirk, New York, became interested and bought the Company, removing it to that city. This latest venture folded as a manufacturing concern during the depression. One of the interested men took over the residue of parts, etc., and up to a few years ago was servicing clocks sent in for restoration.

The first model operated with the pendulum getting an impulse on both the right and left turn of its torsion pendulum. But few of these were made. The later model was somewhat smaller, with the pendulum being impulsed only on its left, or counter-clockwise turn. A few

movements were installed in wall cases and banjo cases, but by far the greater number were like your Tiffany Never-Wind, and most were known at the factory as movement No. 2006.

If you can obtain a four and one-half volt radio "A" battery of a size that will fit in the base of your case, it will operate your clock satisfactorily from 12 to 16 months. You may make a battery by taping together three size "D" flashlight cells, and connecting them in series. When soldering connections to the cells, do not use acid or acid core solder. Any good soft solder, non-corrosive soldering paste, and a good hot iron will make the solder connection. Make this connection in the shortest possible time—just a quick touch of the iron—so as to heat the cell as little as possible.

Here are a couple of pointers to file away on the Never-Wind: Horolovar .005 spring will work, or Mr. Terwilliger now stocks a spring for it. Length of spring is six and one-quarter inches. Distance between top chock and contact pin is 12 mm. Reg. nut should vary clock about two minutes per day for one-quarter turn. Clock should contact each 12 seconds, five times per minute, if you care to check it by a stop watch. Never oil any part of the mechanism. Old advertisement says "tolerance of five minutes per month."

J.E.C.

Pennwood clock motor

Dear Mr. Coleman:

Can you tell me where I could get a motor for a Pennwood clock? I have tried Krause Bros. in Chicago, but they were unable to supply.

HADALLER JEWELRY COMPANY
Giggansville, Missouri

Gentlemen:

Have you tried Pennwood Numerchron Company, 7249 Franktown Avenue, Pittsburgh 8, Pennsylvania? We think they will supply you with the motor. Empire Clock Company, Inc., 93 East 5th Street, St. Paul 1, Minnesota, can also supply it.

J.E.C.

Mercury pendulum expensive

Dear Mr. Coleman:

I enjoy reading your column "Clockwise and Otherwise," and have gained a wealth of information from it. I have taken the American Horologist and Jeweler since 1947 and this winter I have gone through the back issues and made up a valuable file of addresses of suppliers for the clock man. I have appreciated the information you have supplied on my past inquiries, and now I am again asking for a little additional information on building a mercury pendulum.

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I have a Model 71 (seconds beat) Seth Thomas regulator which has a very fine movement, incorporating such features as jeweled escapement, beat adjuster, polished cut steel pinions, maintaining power, weight powered and counter balanced minute hand. However, the present pendulum is not too good. It appears to have either a steel or Invar metal rod and the bob is made of two steel tubes, approximately eight inches in height and one and three-eighths inch in diameter, filled with lead. The factory seems unable to identify this type of pendulum, claiming that it must be an Invar rod with mercury in jars for a bob. Since I bought the clock used, it could have had a mercury pendulum when new. Apparently someone broke the jars and substituted these lead filled cylinders.

Anyway, I wish to build a mercury pendulum for it and need the following information: I wish to use an Invar rod and want to know if there is an easy test to determine if this present rod is Invar metal or steel? With the present price of about $7.00 per pound for mercury, what is the least amount required? Ward Goodrich's book calls for about 10 pounds, yet a recent letter from the Howard clock company states that they use but four pounds, seven ounces in their regulators.

What size jars would be needed? Would like the height required and both inside and outside diameters. Since the Goodrich book was originally published in 1906, it is presumed he used a steel rod in conjunction with his jars, eight and three-eighths inches high with column of mercury seven and five-eighths inches high. Since Invar has a much lower expansion rate, couldn't this use a shorter jar to keep the two rates of expansion in balance? Also, does the mercury have to be sealed air-tight in the jars, or would a brass cap, fitting friction tight, be sufficient just to keep out the dirt?

Your column has supplied me with the address of the Pennsylvania Steel Company for the Invar and the Chicago address for the glass jars, and if you can supply the above data, I can start my project.

I have lately been appointed watch inspector for the Milwaukee Railroad, and need a better timepiece. The clock in its present condition varies from one to three seconds in 24 hours, and a good mercury pendulum should rate about ten seconds per month with a 20 degree variation in temperature over a 24-hour period. Thank you for past favors.

CLIFFORD N. HARTHILL
Pine City, Washington

Dear Mr. Harthill:

Your deduction that Goodrich was not using Invar is, in all probability, correct. However, do not allow the original Goodrich publication date (1906) to make you think that Invar isn't that old.

Dr. Charles-Edouard Guillaume (1861-1938) began studies on nickel-alloy as early as 1891. It was first called Invar from invariable, by Professor Marc Thury in the Swiss Horological Journal in 1897. By 1906, it was well known. I'm sure that Goodrich must have known of it, and feel that he did not suggest it because it was not readily available and at a popular price.

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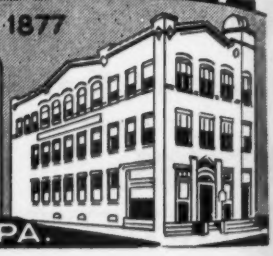

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As to weight, we let ourselves into a tremendous argument. Who can say that Goodrich's is right, or that Howard's four pounds, seven ounces is wrong? One of the fundamental laws of the pendulum is that the time of swing depends *only* on the length and not at all on the weight.

While the basic principles of the mercury compensated pendulum are quite simple, the problem of calculating the size of the jar (or jars) so that the exact amount of mercury will rise the exact distance to accurately compensate for the downward expansion of the rod is far too long and too complicated to include in a letter. The chapter, "Mercurial Pendulums," beginning on page 89 of T.D. Wright's "Technical Horology," pretty well covers it. (This section appeared in about the March, 1955, issue of A.H.&J.)

If I were in your position, I think that I would not go to the trouble and expense of glass jars, mercury, etc., but instead build the pendulum with Invar rod and lead bob suggested by Dr. A. L. Rawlings, page 97 of "The Science of Clocks and Watches" (No. B-167, second edition, $5.00, A.H.&J. Book Dept.) and use Invar for the supension spring. I feel that the end result would be equally as good, if not better, and I know that the time and expense would be considerably less.

Whether you go ahead with the mercury, or change to the lead bob, we'd like a letter describing it—including cost of materials, man-hours required to build, and details of rate obtained, after you have had fair time to test it. J.E.C.

Clock bushing tool

Dear Mr. Coleman:

Would you kindly tell me what you consider the best bushing tool for clocks —one where the dismantling of the clock is unnecessary. Could you give me the name of the firm supplying such a tool?

PAUL NADEAU

82 Wellington North
Sherbrooke, Quebec, Canada

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that it may be used without disassembling the movement, is the one manufactured and marketed by John W. Fisher, Prairie du Sac, Wisconsin.

We believe that this tool was primarily designed for the garden variety of Connecticut one and eight-day movements, and have found that it is practical for them, as well as many bearings toward the end of the trains in many long case movements. For the smaller French carriage clocks, and some of the fine French movements on the small side, I've found that dismantling and using smaller bearings is better.

Mr. Fisher will be pleased to discuss these features with you if you will write to him at the above address. J.E.C.

Poole battery clock

Dear Mr. Coleman:

I have read your Clockwise and Otherwise for several years and have enjoyed it very much, besides learning a great deal from it. I might add that I have been a member of the National Association of Watch and Clock Collectors for several years and own over 200 old clocks, mostly American, but occasionally run into something that sticks me.

Right now I have two clocks that run with batteries. The first is a Poole that has three one-and-one-half volt flashlight batteries that don't want to run. Everything seems to be alright but it will run for a few moments, and then stop.

The second is a Tiffany Never-Wind Clock, Buffalo, New York, Patent 3/8/04. The battery evidently goes under the base. Can you tell me where to get one? It would take an unusual shape to fit in.

J. HOWARD NELLIS
34 Maple Street
Broadalbin, New York

Dear Mr. Nellis:

A coincidence—two questions on the Tiffany Never-Wind coming up the same issue. Couple of answers back, we dealt at length with it and refer you to the answer to Mr. G. H. Cooper, Aledo, Illinois.

It is difficult to pin-point the trouble with your Poole clock merely from the statement that it runs for a few minutes and then stops. Possibly, if we touched briefly on the way your Poole operates, it may assist you in locating the trouble.

Basically, the Poole is a "remontoire" type clock. That is, the driving power is "re-mounted" (rewound) periodically. No doubt you have noticed the elaborate cross-bar sort of member across the entire movement at back. On this is a little free mounted wheel. When the knife blade carried on the pendulum rod catches within the very small notch in the swinging trigger, this cross-bar is released. As it comes down, the little free wheel strikes the pendulum rod, giving it an impulse. When it reaches the bottom of its downward stroke, two contact fingers have come down with it (right behind the numeral "1") closing the battery circuit, energizing the electro magnets, which in turn lift or "re-mount" the cross-bar.

First you should check out the electric circuit. You have three size "D" cells in the base or stacked at the back of the clock. File or scrape the tops and bottoms

of the cells so that bright clean metal touches bright clean metal. Then, trip the cross-bar by raising the trigger with your finger. It should be jerked up with a quick zip—this would indicate that the circuit is alright. If it does not, look to the contact. Again, clean metal should touch clean metal.

One source of trouble on the Poole can be the trigger. It should swing or dangle perfectly free on all those trips where the pendulum passes it, and only engage the knife-blade within its notch when the pendulum's momentum falls off to that point. See that the trigger is perfectly free and dry (it should not be oiled) and that when undisturbed, it points straight down. There is a cross mark just under your pendulum to aid you in plumbing the clock starboard and port, fore and aft—in the position of "rest" the bottom tip of the pendulum should point exactly where the cross lines intersect.

The Poole is the exact opposite of the spring driven clock. Its pendulum drives the clock instead of the clock driving the pendulum. If you have one of the later models, short pendulum (Morse Chain Co., Ithaca, N. Y.) it will impulse the pendulum and re-mount about every 15 seconds—four times per minute. We trust this will enable you to correct your trouble. If it doesn't, write again, giving details.

J.E.C.

????

Dear Mr. Coleman:

I have read and saved your columns for quite a few years, and now I must shoot a couple of questions to you.

First, is there any place where I can buy leather to make new leathers for the hammers on chime and gong striking clocks? I have tried many jobbers to no avail, and have written to Seth Thomas and they replied that they were sorry, but they do not sell raw materials.

I would like to know also where I can purchase the spring wire used for the return on the counting hook and stop levers of gong striking clocks.

Second, I have in for overhaul and cleaning a French clock in a glass and bronze case. The pillars and base and

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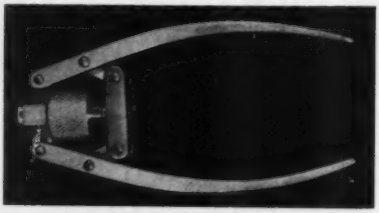

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2621 University Ave. San Diego 4, Calif.

top are decorated in two shades of blue and white enamel. My problem is how to clean and polish this bronze and enamel to the original tone. Some of the bronze has turned green.

Do you have any idea of the charges for clock work to the trade? I do some work for the trade and also straight customer work. I don't think my prices are too high—no one seems to be dissatisfied, but I have wondered many times whether or not I am in line. From stories passed along by customers there do not seem to be too many repairmen around who want to, or know how to, do a good job on clocks. I do all sorts of clocks, timers, regulators, etc.

I am enclosing the tracing of the markings on the dial of an old grandfather clock that I have just repaired. These are the only markings on the clock or case. The owner claims it has been in the family for many, many years. It comes from Boston, Massachusetts, and seems to be completely hand made, gears, pinions, dial case, etc. Could you throw any light on the age of this clock with these markings? Thank you for your kind cooperation and assistance.

C. F. ARMSTRONG.
38 Oakmere Drive
Baldwin, L.I., N.Y.

Dear Mr. Armstrong:

Your letter is appreciated. Certainly, shoot in the questions. Actually that is the main business of this column—trying to answer questions. This reminds us of an incident during the depression. We had just set up a grandfather clock in a home, and it was the custom to phone the shop to report and see whether or not any calls had come in from that section. We asked for permission to use the phone, and after making the call, decided to make another one. No directory was in sight, so we asked for it. The lady suggested that we call information. We objected on the grounds that we did not care to trouble the phone company when we could look the number up. I can see her now as she drew up to her full height and said: "See here, young fellow, my daughter is an information operator down there, and if everybody looked up the number, she would be out of a job!"

Mantel clocks and many chime clocks merely have a little piece of oak leather inserted in a hole in the hammer. Stop in at the nearest 5-&-10 and pick up an old-fashioned treadle sewing machine belt and you will have a supply of hammer leather for the next 10 years. Sharpen the end slightly, just as you sharpen a pencil, force it in, and cut to wanted length with sharp knife.

Most hardware stores and machine supply houses stock brass spring wire. It comes on wooden spools like thread and in many sizes. For cleaning metal clock cases, we use the regular clock cleaning solution (given here many times) with good results.

"Trade" prices are a very difficult thing to peg down, and depend on a number of factors as well as the prevailing retail prices in your neighborhood. Are the jobs brought to your shop and called for? Or do you make the call and deliver them? We dealt at length with the price question last month in the letter to Mr. Morris D. Hammond. Frankly, we have a pretty dim view of trade work based on some sad experiences. Looking over the past, I can recall several accounts, some on a 60-40 basis and some on a two-thirds, one-third basis, that were headaches. Many stores (especially when watch work is slack) will cull the jobs, grab off the glasses, mainsprings, etc., and send you only the "stinkers."

We shall have to ask for a rain-check on the grandfather clock as no "I.H.&J. Selfrich" is listed. J.E.C.

Needs spiral type gong

Dear Mr. Coleman:

A customer wishes to replace the bell strike in an old grandfather clock with a spiral type gong. He, of course, wants the heavy mellow gong. I have had great difficulty trying to find one. Could you please advise me where I might locate such a gong? PAUL FISK
108 Second Street, S.W.
Charlottesville, Virginia

Dear Mr. Fisk:

We believe that you can locate one of those large German spiral type gongs at: Vin Acco Time Repairs, 2221 Fowler Street, Cincinnati 6, Ohio.

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Suggest that you include a sketch with your letter. Show close approximate measurements as to the space in which you have to mount the gong, and how you propose to mount it. This will aid them in locating a size practical for your particular job. J.E.C.

Why plate discoloration?

Dear Mr. Coleman:

Your column is the only source of repair information concerning clocks that I can find, so keep up the good work.

I have a few questions about clock cleaning solutions. Recently I made up the "Daniels solution," one-half gallon of it: two ounces oelic, four ounces of acetone, eight ounces of 28 per cent ammonia, and 16 ounces of distilled water. After I put the clock movement, Seth Thomas, into the solution, the top plate discolored. It turned dark blue and streaked. After it had discolored, the best I could do was to steel-wool the plate. What did I do wrong?

How long should the movements be left in the solution, and what would make a good rinsing solution?

RAYMOND L. OATES
125 Jackson Street
Lockport, New York

Dear Mr. Oates:

Many horologists have had, and are having, complete success with this cleaning solution. There is on the market an acetone which differs slightly from the standard product we are accustomed to getting. I have had only one gallon of it, and failed to make note of what the particular difference was. It is "inverted," or "synthetic," or something like that.

You can readily tell if you get some of it. With the standard type, your solution when first mixed is practically colorless. With this "off type," a fresh mix turns a violent pink in a very few minutes, and then dark — almost black — after being used a few times. It is no good, and almost always stains.

Brass parts (wheels and plates) may remain in the solution, provided they are completely covered, up to a couple of hours without ill effects. From what you

say, I'd judge that you allowed your parts to remain out in the air for a few minutes before you rinsed them. Ammonia plus oxygen (air) will color brass quickly. The trick is to transfer the parts cleaned from the cleaning solution to the rinse in the shortest possible time.

We use this cleaner warm (never permit it to boil) and have the container sitting close to the sink. Parts are quickly brought from it and held under the tap with water running almost hot. Then they are put into alcohol, then into the sawdust for drying. Would appreciate a card letting us know if this eliminated your trouble. J.E.C.

Another Tobias

Dear Mr. Coleman:

Would you be interested in an old watch described as follows: man's silver watch, purchased about 1825, gold hands, inscription inside back: "cylinder escapement, four jewelled. Flands, M.I. Tobias, Liverpool." Silver chain with hook and key attached. If you would be interested, please make your best offer.

I have four other watches, comparatively modern—about 1900, and several pieces of old jewelry. Shall be glad to send description if you could use them.

EDNA M. CLARK

62 Thirtieth Avenue
Columbus 1, Ohio

Dear Mrs. Clark:

We appreciate your inquiry and will try to come up with a suggestion. But—the column does not buy, sell or appraise old timepieces.

Miel Isaac Tobias was a watch dealer in Liverpool, exporting watches from about 1814 to 1837. Thus, your date of 1825 is pretty accurate. Miel Isaac Tobias & Co. is first listed at 29 Lord Street for 1814. It was just Miel Isaac Tobias, at 11 Great George Street, for 1834. He is last listed at 21 Canning Street for the year 1837. Since you say it is a four jewel cylinder watch, we believe that it is of Swiss manufacture, and doubt if it has much appeal for the collector.

Suggest that you phone Mr. H. E. Seff, AD-6972, there in Columbus. He is a member of the National Association of

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Watch and Clock Collectors and will explain how you may insert an advertisement in the Association's publication, "The Mart." J.E.C.

Seth Thomas problem

Dear Mr. Coleman:

I have been a reader of A.H.&J. for many years and greatly appreciate the information published.

I do very little clock work as I specialize in the repair of watches. I have a problem on an eight-day Seth Thomas, No. Ten, time only, two barrels. The clock is quite old and one of the jewels in the one cone is cracked badly. The spring seems to bind in the barrels, and in fact, it may require a complete overhaul job. Whom do you suggest to do a complete job so that the clock would be a satisfactory timekeeper? This clock was rebushed at one time. Would appreciate an early reply.

WILBER UHRICH

1618 Brending Road
Akron 10, Ohio

Dear Mr. Uhrich:

Write to: William A. Phelps, 4106½ Glenway Avenue, Cincinnati 5, Ohio; outline your No. Ten, Seth Thomas problem and ask for shipping instructions. He will drop you a card. J.E.C.

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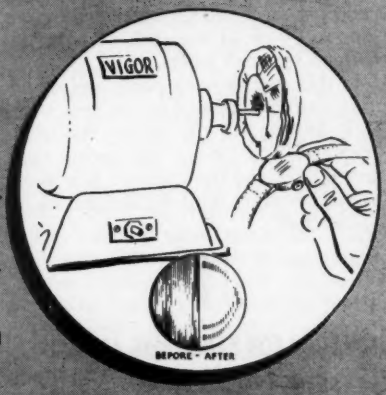

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Watchmakers' Contest

Winners of A. H. & J. Watchmakers' Contest for February

First prize: DeVries Case Opening Tool, to Walter A. Dewey, 6732 Manor Crest, Oakland 18, California, for his "Tool for Colleting Hairspring," Contest Entry No. 97.

Second prize: Repair Parts Kit for 10½ L, AS 1194, to Bernard M. Lacombe, 3456 La Fontain, Montreal 4, Quebec, Canada, for his "Drawing Temper of a Riveted Staff," Contest Entry No. 95.

Third prize: Movement Holder, to R. W. Simpson, 40 N. E. Third Avenue, c/o Y. M. C. A., Miami 32, Florida, for his "Measuring Settings of Pallet Stones," Contest Entry No. 96.

REDUCING SUSPENSION SPRING STRENGTH

CONTEST ENTRY #98

My entry in the Watchmakers' Contest consists of a method for reducing the strength of 400-day clock suspension springs.

At times when the proper spring is not at hand, a spring of greater thickness may be reduced rather uniformly to the required strength in this manner: Place the spring on a fine India stone cork, leaving a small portion of the spring extending on the opposite side of the cork in order to be grasped by small pliers.

Hold this end between pliers and while exerting uniform pressure on the cork with the first finger, pull the spring out from between cork and stone. The spring may be turned over and the opposite side done in the same manner until the desired thickness is reached.

BLUEING CLOCK HANDS

CONTEST ENTRY #100

A "blue" for clock hands may be made by adding a little Mechanic's or Prussian Blue to a small amount of any clear lacquer. This is a dye used by machinists to show high spots when scraping bearings, and it may be purchased in small tubes.

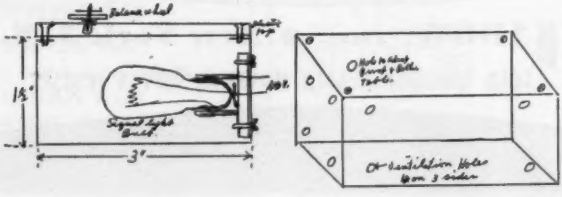
If properly applied to clock hands, this blue lacquer produces a coating that is remarkably like the blueing obtained by heating.

ILLUMINATION FOR HAIRSPRING ADJUSTING

CONTEST ENTRY #99

I have not been satisfied with overhead lighting for adjusting coils of hairsprings, so tried a lighted working table where the illumination came from below the working surface.

A small box, 1½ x 1½ x 3 inches, was constructed with the top and bottom left open. Aluminum sheet was used to construct the box. An opal or white plastic top was secured with four countersunk flathead screws. This box is ventilated with 12 ¼-inch holes. A small light bulb and socket is mounted beneath the top. The top has a hole drilled sufficiently deep to clear the balance pivot, and just large enough to admit the roller table and allow the balance wheel to lie flat on the working surface.



What, No-Peg?

By Jack Ferris
Jeweler Aids Company

FERRIS No-Peg pearl cement is by now well known to most readers of the American Horologist and Jeweler. Yet, because No-Peg is so completely different from other pearl cements, there is some confusion regarding its use. I am, therefore, most grateful for this opportunity to try to throw some light on the subject.

Just for comparison, the solid type of pearl cement, known as "French" cement, softens and becomes sticky when heated. It is, therefore, a *thermoplastic* or *heat softening* material. No-Peg, on the other hand, sets or hardens with heat and is, therefore, a *thermosetting* or *heat hardening* material. Now, if No-Peg were to begin hardening at the factory, it would be worthless when it reached you. For this reason, the hardener part of the formula is packed in a separate container to be added before use. In other words, the cement, called part "A," will remain soft and sticky indefinitely until the proper amount of hardener, called part "B," is added and blended with it. This, basically, is the system involved in using No-Peg pearl cement. It can now be readily seen how erroneous it is to look upon part "B" as a thinner or a diluent.

For the benefit of our exacting friends, the best proportion of "A" to "B" is 7 to 1 (7 parts cement to 1 part hardener, by weight). Since it is not practical to weigh very small amounts of No-Peg, each No-Peg kit comes with a tiny spoon for measuring the cement and a dropper for measuring the hardener. This measuring spoon was so designed that the amount of cement it holds, when leveled, requires the addition of one drop of hardener. After the leveling operation, you must, of course, return to stock any cement adhering to the mixing spatula. This is the smallest amount practical to measure. It is not safe to try to cut the size of this mix, because it is difficult to split a drop of hardener, and still maintain the proper ratio of "A" to "B." Considering the value of a pearl and the cost per mix of No-Peg, the wisdom of economizing this way is indeed questionable.

The mixing is best done on a glass or metal surface. Paper, wood or other porous surfaces will absorb some of the hardener and defeat its purpose. I like to use small squares of aluminum foil with a paper backing. These are cheap and disposable. As important as proper proportioning, is the thorough blending of the two parts. A series of alternate mashing and scraping motions with your mixing spatula will accomplish this in no time at all. Do not judge the correctness of the mix by its consistency. All other conditions being equal, No-Peg will be more fluid in a warm atmosphere.

The above is not a difficult or time-consuming operation, as any veteran No-Peg user will tell you. The results are well worth the slight effort. Difficulties arise only when jewelers take it upon themselves to alter the system.

Cemented jobs will cure at room temperature in about 10 hours. However, higher heat, up to 175° F. reduces the curing time to as little as 10 minutes and does a better job. I use a 250-watt infrared electric lamp adjusted for a distance of 8 inches between the work and the lamp. Do not expose heat-sensitive colored stones to this lamp. Allow jobs to cool before handling.

To remove a pearl cemented with No-Peg, simply immerse the job in boiling water for a few seconds. Hold the work with a towel and pry the pearl loose with a dull knife edge, while the cement is hot. No-Peg does not melt when heated but it does become weak while in a heated condition. Other methods of applying heat may be employed, but with this method, there is no danger of burning the pearl.

The shelf life of No-Peg part "A" is practically unlimited. However, the hardener will thicken and discolor with age. When this happens, it is best to replace it with a fresh bottle. The time it takes to reach this condition will vary with individual handling.

Finally, a bit of common sense goes a long way in using No-Peg. For instance, you can hardly expect good adhesion to dirty or greasy surfaces. Keep your kit clean. Wipe your measuring spoon and mixing spatula dry with a bit of cleansing tissue. If you run hot water through the glass dropper after use and shake it dry, it will never gum up.

While No-Peg derives its name from the fact that in many applications there is no need for a drilled hole or peg, it would be foolish not to use a peg where the pearl has great value or where the pearl is likely to be subjected to abuse, as on a finger ring.

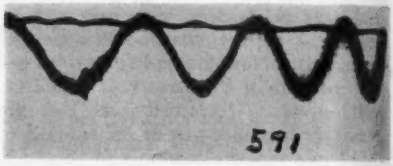
Watch Repairman and the OSCILLOSCOPE

By Carl H. Anderson

Effects of Too Much Brightness in Oscillograms

LET us now examine a few oscillograms. In No. 591 we see a wavy line and a rather straight line across the top. This oscillogram is four sine waves of a 60-cycle electric current. The dot of light starts at the upper left hand corner, travels down and to the right until it reaches the bottom of the wave where it reverses itself and starts to travel up, while traveling from left to right all of the time. When the dot reaches the top, we have the completion of one cycle. Since this is happening 60 times per second, it therefore took the dot 1/60 of a second to travel this distance. Dividing 60 into 1,000 (the number of milliseconds in one second) the answer is 16⅔, therefore it took the dot 16⅔ milliseconds to travel this distance.

The dot continues to travel to the right and traces out the second cycle, then the third cycle and finally the fourth one. Observe closely the horizontal distance from the peak of one wave to the peak of the next wave. If you will measure from the first peak to the second peak, you will find the horizontal distance is approximately four times that of the horizontal distance between the last two peaks. By measuring between each pair of peaks, you will find the horizontal distance between peaks decreases as the peaks progress from left to right. This is known as "non-linearity," or in other words, each of the peaks (or valleys) is not the same horizontal distance apart. On the other hand, in spite of this non-linearity, the time between each of the peaks (or valleys) is exactly the same.



From the beginning peak at the left to the next peak is exactly 1/60 of a second, and the same is true at the right end. In other words as the dot of light moves from left to right it slows down in horizontal speed, but not in vertical speed because by measuring the vertical amplitude of any of the peaks you will find them to all be the same, except the last one on the right. Therefore it is readily seen from this that the dot of light travels at the same vertical speed at all times, but at a gradually decreasing horizontal speed as it moves from left to right. The particular oscilloscope from which this oscillogram was made is quite non-linear. On the other hand there are oscilloscopes which are perfectly linear which makes the horizontal distance from one peak to the next one (in either direction, or from valley to valley) exactly the same. Linear oscilloscopes require a more complicated circuit and more parts, therefore cost slightly more than non-linear ones.

Now observe the last peak at the right. Notice it does not quite reach the same vertical height (amplitude) as the other peaks. Also notice that at the end of this peak there is a line which is practically horizontal which returns from the

right end of the sine waves to the left end, or beginning of the sine waves. This is called the "return trace" and is where the dot of light returns from the right end of the screen to the left end of the screen to start making the next trace (or pattern). You may observe that the return trace is not perfectly level, that is, it gradually slopes up from the right end. Quite naturally some time is consumed in the return of the dot of light from the right end to the left end. The time of the return trace can be computed quite easily from such an oscillogram. If the time of one cycle is 16⅔ milliseconds, it is quite easy to take a pair of draftsman's dividers and measure up and down the sine wave to obtain the total length of the line from one peak to the next one.

Let us say we set the dividers at 1/17 of this distance, which is close enough and will be approximately 1 millisecond, since the total length of the cycle is 16⅔ milliseconds. Then by measuring from the end or top of the last cycle on up vertically to a horizontal line drawn across the top of the four cycles, this will be the distance which the last cycle is short in time duration from the other cycles. As an example, let us say, this distance is found to be 1/17 of the total length of one cycle; therefore the time of the return trace would be approximately 1 millisecond because the last upward swing of the dot of light would have reached the same height as the other peaks in that length of time. In this particular oscillogram, the actual measurement is about ¼ of a millisecond. On the more expensive oscilloscopes the return trace is completely blanked out which again requires more parts and adds to the cost.

By careful observance it will be seen that the return trace is quite wavy, which shows each of the return traces is not traveling back over exactly the same path or route. Since there are four cycles in this pattern, and this is of a 60-cycle electric current, dividing 4 into 60 means the sweep rate is 15 per second which in turn means the trace is appearing on the screen of the cathode ray tube 15 times per second. Every time the dot traverses the screen from left to right, it must therefore return to the beginning point on the left side. Having traveled from left to right 15 times in one second, there must therefore be 15 return traces in the same length of time. Whenever the return trace occurs many times per second it is quite difficult to make each and every one of these returns travel over exactly the same route or path. This in turn causes the return trace line to be wavy.

Oscillograms Nos. 591, 508, 563 and 575 are excellent examples of having the brightness control advanced too far. While this makes the trace much brighter to the eye, it also energizes more of the phosphor of the screen of the cathode ray tube, which in turn makes the lines of the trace much wider. In No. 591 the brightness of the trace is such that in the right hand half of the trace small squares are seen. This is because the trace was so bright it lighted up the quadrille ruling of the reticule covering the face of the tube. On this particular oscilloscope,

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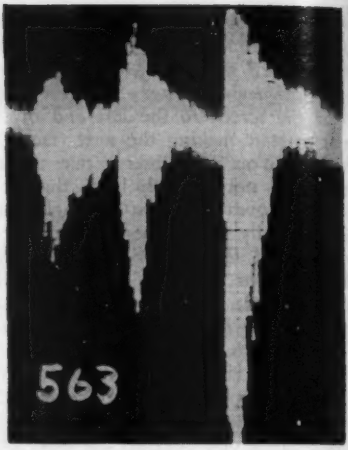
there is a transparent sheet of plastic (reticule) over the face of the cathode ray tube. This plastic is ruled off vertically and horizontally in lines which are 1/10-inch apart. The inch lines being about twice as heavy as the 1/10-inch lines. In No. 591 the light intensity of the dot is so bright that it energizes some of the prosphor on each side of the pip causing it to glow. The black lines of the quadrille ruling being in front of the screen, they show up as white lines thus dividing the over-glow into small squares.

In oscillogram No. 508 the lighting of the reticule is quite clear and distinct. You can easily see each of the little squares. Also the brightness of the dot is energizing such a large area of the phosphor that the pips are quite broad. Notice at the left end before the first group of long pips that it is impossible to distinguish any pips whatsoever. Then

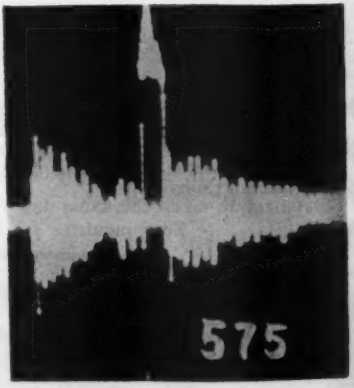
the first group of pips is so bright that the quadrille ruling of the reticule shows through them.

From about the center, on to the right end, the quadrille ruling shows up quite clearly. With a trace on the screen of such brightness it is impossible to make a correct diagnosis of the condition of a watch. All that can be definitely determined is that the oil on the balance pivots is quite bad, and likewise the oil on the impulse faces of the pallet stones and escape wheel teeth is quite gummy. On the other hand the oil on the pallet arbor pivots is in quite good condition. When the brightness control on the oscilloscope was reduced many other conditions showed up which can not be found in No. 508.

In No. 563 we again have the brightness control advanced too far. Here the



quadrille ruling of the reticule shows up much plainer than in No. 508. The pip lines are so wide that a complete diagnosis can not be made, but some things are quite apparent. The trace of the escapement action is impressed on a 60-cycle sine wave and it is quite readily seen that the trace is occupying over one and one-half cycles, which is too much escapement action time. One thing is quite easily seen however, and that is, the positive half of the pips are clipped, while the negative halves are quite long. Notice particularly that the upper parts of the pips (above the 60-cycle sine wave, which is the positive half) are only about one-fourth as long as the lower parts of the pips (which is the negative half). This is called "clipping." It does not make



any difference to the viewer, if he knows there is such a thing as clipping and can recognize it when he sees it.

In oscillogram No. 575 it is seen that the pips are quite wide, in fact so wide that there appears to be only a very limited number of them. When the brightness control was turned down to normal and the pips counted, there was found to be 288 of them, while in the oscillogram one can actually distinguish only 65 pips. From a photographic standpoint all of these oscillograms are excellent, but from the standpoint of an analysis of the watch condition they are almost worthless because about the only thing which can be determined with accuracy is that these watches all have bad oil conditions and also the total time duration of the escapement action is much too long.

* * *

Last month I offered the readers a bulletin on a voltage adjuster if they would write me at Denver. This month I have another one which I will send everyone who writes me in care of A.H.&J. at Denver. This one covers "Fitting Oversize Staffs and Stems from Your Present Regular Stock With or Without Making Any Alterations." It is surprising how many men at the bench there are who do not know that positively every staff or stem they have in stock is of the *correct oversize measurement for some other watch.* Also, many do not know that one staff may be of exactly correct measurement for several different calibres. Has anyone ever told you what the height measurement of a staff is?

Let us put it this way. Did you ever try to fit a staff to a watch and when you tried it for fit of the balance wheel, collet and roller table and end shake everything was perfect, but when you staked the staff into the wheel and tried spinning the wheel in the watch that either the top of the balance rim rubbed the under side of the cock plate, or the bottom of the balance rim rubbed the top of the lever bridge? Certainly you have worked on many watches where someone had filed a slot in the under side of the cock plate or filed off the top of the lever bridge so the balance did not rub. Do you know what was wrong with the staff the other fellow tried to use? It was the height measurement. What is the height measurement? It is the distance from the end of the bottom pivot to the balance seat or the top of the hub of the staff. Think just a moment. If this distance is too short, the bottom of the balance rim is sure to rub the top of the lever bridge, and if this distance is too great, the top of the balance rim is going to rub the under side of the balance cock.

I have prepared a special bulletin covering all of these things, and will be glad to send you a copy free and without obligation. All I ask is that you send a 3-cent stamp to pay the postage as the bulletin will be sent you first class mail. Do not send a stamped, self-addressed envelope, send only the stamp as this bulletin will not fit in the average letter envelope. Write me in care of the American Horologist and Jeweler, P. O. Box 7127, Capitol Hill Station, Denver 6, Colorado. This is the only way you can get this bulletin. Do not write me at the Lexington, Kentucky, address; you must write to Denver. The bulletin also

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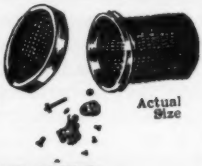

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"The Watchmaker's RIGHT HAND"

contains information about the correct factory measurements of 3959 Swiss balance staffs and 910 Swiss stems, telling you if the staff or stem is correct factory measurement for more than one calibre or make.

How many times have returning G. I.'s brought you watches which you could not identify or you could not get a staff or stem to fit? With this information you can select a staff or stem of the nearest measurement and make whatever small correction is needed.

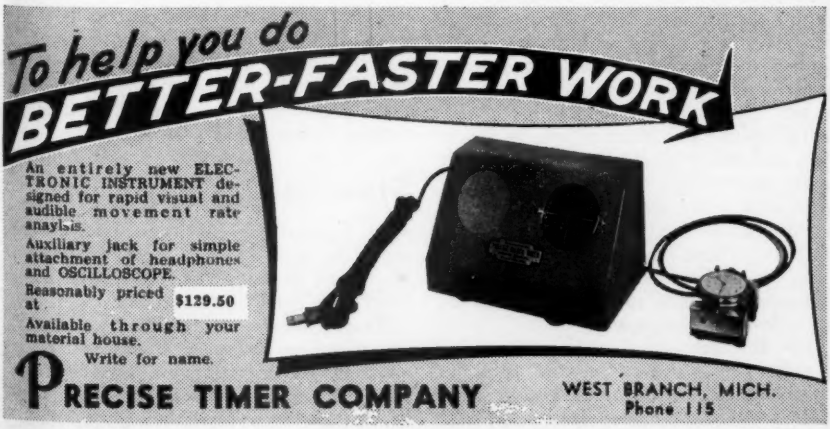
Let us take an actual example. Suppose we have a Bulova 7AP which needs a staff. First, we carefully cut out the old staff. Then when we try one of our new staffs we find the collet and roller fit perfectly and the same for the endshake, but the balance seat on our staff is too small and it wobbles around in the hole in the balance arm. (This was probably caused by someone before us knocking out the old staff with a knock-out tool instead of cutting it out). Immediately we know we must have a staff with an oversize balance seat. Since the usual staff cabinets do not contain what the average man at the bench calls "oversize," we think we will have to order one. But—do we? Could we possibly have another staff in our cabinet which would be of the correct oversize measurement? The first thing we will have to do is to find the correct measurement of the original staff, then find one with an oversize balance seat.

By referring to our table we find the 7AP staff to be 292 long, height 144, balance seat 80, roller seat 37 and collet 52. (All measurements in hundredths of a millimeter). Staffs which are usually sold as oversize have a balance seat 5/100 millimeter larger than the original, so we start looking through our table for a staff which has an 85 balance seat and the other measurements as close as possible. When we run down the table, we find Eta calibre 1051 has the following measurements: 295 long, 144 height, 85 balance seat, 37 roller seat and 51 collet seat. The differences are that the Eta 1051 is 3/100 longer which will not make a great deal of difference as we can either polish off a little from the end of each pivot, or we can bump the balance bridge slight-

ly to get the proper end shake. The Eta 1051 has a 1/100 millimeter smaller collet seat than the 7AP but we can very slightly close the collet to take care of that. When we try the balance wheel on the staff we find the arm fits down very snug, or if it doesn't fit down, we can turn the seat down very slightly. Thus we have found how to fit a staff to a watch which needs an oversize balance seat. There will be others where it is necessary to make an alteration as all the measurements will be correct except one or two. Any good workman can make these alterations very easily. By so doing, you use a staff out of your present stock and do not have to hold the watch until you can order and get one. By the same method you can select a staff which is oversize (or undersize either) in any of its measurements.

When you go to look for the Eta 1051 staff in your stock, if you find you do not have it, you once again go back to your measurement table and select the staff with the next nearest measurements and see if you have it in stock. You will usually find you have one which will not have to be altered very much and at the most in only one or two places.

Now suppose the watch needs a stem with an oversize hub. In our table we find the 7AP has the following measurements: square 68, length from end of square to slot 310, winding pinion seat 87, hub 140, thread 90 and pilot 47. Running through our table we find a Font 155 (Benrus AK) stem has the following measurements: square 69, length from end of square to slot 307, winding pinion seat 89, hub 150, thread 90 and pilot 45. Thus we see our Font 155 has a square 1/100 larger than the 7AP, but the square hole in the clutch may be worn that much, or more; the length from the end of the square to the slot is 3/100 millimeters short, not enough to worry about as the square that much shorter will not slip out of the square inside the clutch; winding pinion seat is 2/100 millimeter larger, hub 10/100 millimeter larger, thread the same and pilot 2/100 smaller. These differences in measurements are not enough to worry about, so we try the stem in the watch. When we do this we find the hub is slightly too large in diameter, so we turn it down slightly in the lathe and lo and behold in a minute or so we have our watch fitted with an oversize stem. By proper use of the measurement tables, you never need be stumped for an odd size stem or staff, because when you go through the measurement tables you are sure to find one which is very close and may need only a very slight alteration in one place. If you want all this information free, simply send me a 3-cent stamp in care of A.H.&J., at Denver and it will be sent you by return first class mail. Be sure to write your name and address legibly as I have had requests I could not fill due to my inability to make out the handwriting.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Jewelry Repairing

By R. ALLEN HARDY

Mr. Hardy invites your questions pertaining to jewelry repairing. Questions should be directed to Mr. Hardy, c/o The American Horologist & Jeweler, Box 7127, Capitol Hill Station, Denver 6, Colorado. Please enclose a self-addressed stamped envelope.

Don't hesitate to help beginners

IT HAS BEEN the general aim of this department to keep discussions on a strictly constructive basis rather than to deal with any controversial subject in an editorial manner. There will be a slight departure at this point in order to "air" a situation that has come to my attention.

I have received a letter, very recently, that is rather disturbing and indicates to me that all is not well within our trade, or at least that some of us need a more progressive attitude. I will not give the name nor the locality. The essence of the letter is this: A young man interested in learning stone setting and jewelry work could get no cooperation whatever from various practitioners to whom he applied for information. Instead as he put it "I received the cold shoulder treatment" as though they were guarding a precious secret. Frankly, I thought the "trade secrets" phase was as out of date as Noah's Ark and that it didn't and couldn't exist in the year 1956. Also—if this were the only such letter that I have received I would discount it as an isolated case. But, it isn't. There have been several references (in various letters) to the hesitancy of some tradesmen to impart helpful information to a beginner.

The first thought that enters my mind is—who helped these tradesmen, reluctant to divulge information, to perfect their trade? Didn't someone lend a helping hand? My next thought is that a real craftsman has no fear of an over-crowded trade—there is always work for him.

What do we fear that we must withhold information?

I have personally trained engravers who could execute cuts within a six months training course that I couldn't surpass with my years of experience. By now I would assume that they are past masters at the art, their natural ability surpassing the instructors. I have taught jewelers and diamond setters with far more natural aptitude than I possessed. To see such aptitude develop is a pleasure—certainly not a cause for alarm.

The trade needs more craftsmen, good ones, and I have never heard of a surplus of good jewelers, diamond setters or engravers. As long as I have been associated with the trade there has been a "crying" shortage.

Stone-setting variations

■ IN PAYING SO much attention to the technique of setting a stone it appears that many variations of treating the same head have been overlooked.

Every diamond to be set in a mounting seems to present a slightly different situation for a very good reason. The stone-setter is given a certain size diamond (factor No. 1) to be set in a given mount-

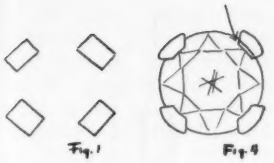
Fig. 1

Fig. 4

Fig. 2

Fig. 5

Fig. 3

Fig. 6

ing (factor No. 2). The job should be done in a manner most flattering to the diamond. For this reason a number of minor variations from the conventional methods may be used to accomplish the desired result.

Figure 1 shows a top-view of a standard four-prong head. This is a very simple setting job and after seating the stone the prongs may be pushed over and shaped as seen in *Figure* 2.

Figure 3 is a very attractive variation that is highly acceptable. This effect is made by splitting each prong using a jewelers saw. The result is eight prongs instead of four.

Figure 4 shows a broad prong slightly tapered on the sides. The tip of the prong may be beveled by using a No. 38 flat graver, highly polished.

Figure 5 shows the split prong variation with each prong tapered.

Figure 6 shows a differently shaped, single-prong treatment. A rounded taper is given each prong.

It is well to acquire the knack of instantly deciding just which treatment should be given to the setting job. The design of the mounting and the method used on the smaller side-diamonds (if any) are the guiding factors.

Figure 7 shows the top view of a very common mounting.

Figure 8 illustrates one method of treating the prongs which is very similar to the fish-tail treatment discussed in previous issues of A.H.&J.

Figure 9 shows a very pleasing and flattering method of setting the same stone in the same head. The edges are milgrained.

Figure 10 shows the top of a flat-top setting before beginning the setting job. There is plenty of metal to work with and this head will accommodate a wide range of sizes. If the stone is large the treatment seen in *Figure 11* is indicated. If the stone is small the method as shown in *Figure 12* will flatter the stone. By using three rows of milgraining all of the area is utilized. To use the method shown in *Figure 11* would be to direct attention to a small stone in a large head. The three rows of milgraining minimize that effect.

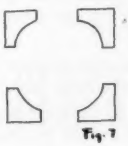
Fig. 7

Fig. 10

Fig. 8

Fig. 11

Fig. 9

Fig. 12

Need for perfection

■ ONE THING we can be sure of—every craftsman, whether engraver, watchmaker or jewelry repairman, has his work constantly under criticism by either his employer, his fellow craftsman or by his customers. Engraving particularly receives closest criticism because the result is pure art, completely a product of the engraver's own invention.

The diamond setter's work receives close inspection, too, but the customer is looking at the appearance of the diamond rather than the masterful setting job. Often a beautiful setting job goes unnoticed since attention is absorbed by the diamond.

And—so it is with watch repairing. All the customer can see is the case and the dial. An excellent repair job cannot usually be seen, but the result of course, shows up in the fine timekeeping of the watch.

Since the merit of the engraver's work depends altogether on visibility, there is all the more need for perfection of work. I have heard all too frequently that "John cuts beautifully, but his work is always slightly out of line." I have seen such work on trays, trophies, silver flatware and many other items. Beautiful work but "out of line" enough to be distracting.

I can hardly believe that the reason for this is merely that the engravers are too rushed to get everything in correct alignment. If there is time to cut so perfectly then there is time to layout the work just as perfectly. I would say the reason for this "off-center" work is bad work habits.

Many engravers overstress the cutting, taking extreme pains with it, yet spend very little time laying out the work. The two phases demand equal attention. Generally speaking, good cutting cannot save a poor design, but a good design can do a lot for inferior cutting.

For example, see *Figure 13.* Here is a fairly simple modern monogram, so precise in its appearance that one line misplaced would destroy the balance completely. In designing such a monogram, center blocking-in lines *a-a'* and *b-b'* should be the first things to consider. The other blocking-in lines can then be "positioned" and the designing begun. Even though the

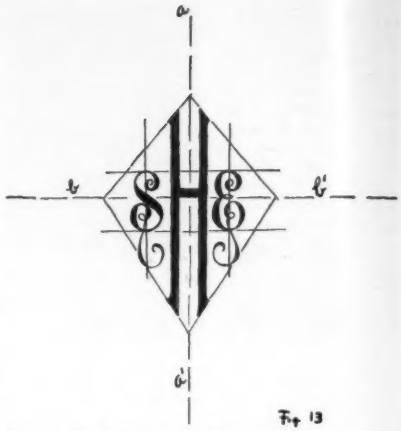

Fig. 13

monogram may be designed and cut perfectly there is still the risk that it can be placed on the article at an angle or "cock-eyed." This should not happen if center-line *a-a'* is in correct alignment with the article.

See *Figure 14* for a preliminary-to-cutting sketch of a ribbon monogram. More blocking-in lines are needed so that side letters may be placed in the proper relation to each other. Without lines *c-c'* and *d-d'* the sketch is likely to result in failure or out-of-balance letters making several drawings necessary. Such monograms done without observing blocking-in lines are apt to appear crowded and the letters may seem forced together rather than symmetrical and "relaxed."

Fig. 14

Figure 15 shows a single letter on a piece of flatware. This is one of the most common sources of "crooked-letter" criticism. Most frequently the reason is not because the letter was not properly designed originally but because of carelessness in aligning the transfer. Of course the engraver should see this before cutting the crooked letters but frequently "battle fatigue" enters into the picture and a few out-of-line transfers will slip through. It is usually a good habit to make all transfers at once, then double check the alignment before proceeding to cut.

Fig. 15

Figure 16 illustrates how an ordinary inscription may be laid out. Just as much care should be taken in placing center lines *a-a' and b-b'*, for if these are out of line in the slightest degree the entire inscription will be spoiled. The most satisfactory method to maintain balance is to follow the rule of working from center. This applies to line placement as well as letter placement. For example, the fourth and fifth lines should be sketched in first, then the third and sixth followed by the second and seventh. The first and eighth lines will then be found to be equidistant from center.

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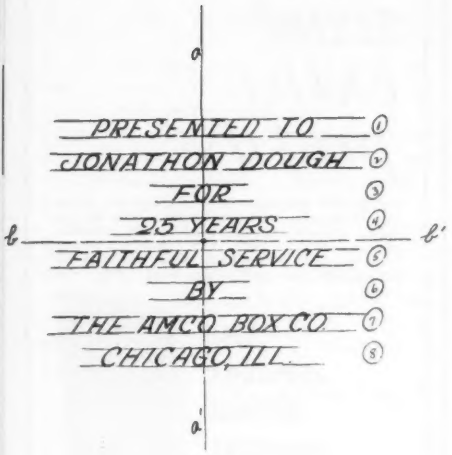


Fig. 16

Consider the general appearance of the inscription *(Figure 16)*. For all its balanced layout there is something rather monotonous in its appearance. If it were cut in the manner as shown the result would be acceptable to be sure, but if it were compared to the layout illustrated in *Figure 17* the monotony would become obvious.

In *Figure 17* the effect of making a run-of-the-mill inscription appear interesting is achieved by emphasizing the key lines and by varying the letter style. The unimportant words are subdued. Customer reaction to this type of inscription is very gratifying and a good reputation can be built on close attention to just such details. In addition to this a better price can be charged.

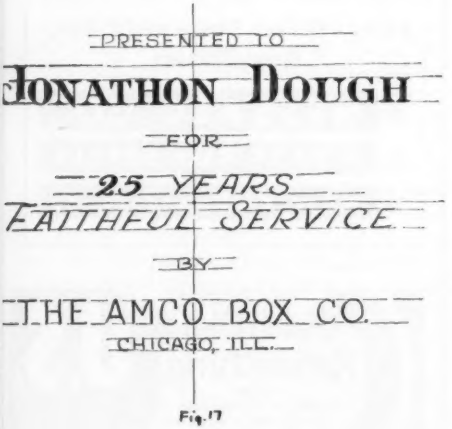


Fig. 17

Figure 18 illustrates how the "design from center" principle is applied to a single name. In this instance the name has four letters and the center will fall between the fourth and fifth letter. These two are sketched in first, then the third, second and first (in that order) followed by the sixth, seventh and eighth (in that order). In this manner the first and eighth letters will be placed equidistant from center.

It will be noted that "A" touches the center line whereas the "T" does not.

Fig. 18

There are many "accidentals" occurring in letter spacing and the study of these is a separate phase of designing. Different words present letter combinations that cause a variety of spacing problems. The "A"-"T" combination in the word "Jonathon" is only one example. The "A" is an open letter—open (or leaving space) at both sides of the top. The "T" is just the opposite being open at both sides at the bottom. All this extra space presents a minor problem and the two letters have to be placed closer together than the normal spacing of other letters. This is called "optical letter spacing" as opposed to "mechanical spacing." But we will go into that more completely in another issue.

Instructions for Replacement of Seamaster Crystals

New Armor-Type Steel-rimmed Seamaster Crystal

Ordinary Crystal in ordinary bezel

To replace the crystals on Omega Seamaster cases, only genuine Seamaster crystals must be used. They come with an inside steel rim which insures correct fit and absolute waterproofness.

The illustrations above of the Seamaster bezel and the regular conventional type bezel show why a genuine Seamaster crystal must be used for Omega Seamaster watches. They will not interchange.

Note that the Seamaster bezel is constructed with a cylindrical side and the crystal and ring are made with a cylindrical edge, assuring a positive "seal" between the bezel and crystal.

Conventional bezels have a V-shape groove. Conventional crystals have a bevel edge, resulting in only a partial contact between bezel and crystal.

The inserting of the crystal must be done in perfect parallel in order not to shear off a portion on one side or the other which could void the waterproof seal. The use of Omega Special Tool C, with its collets, is recommended for this purpose.

Whether or not Omega Special Tool C with its accessory collets, made to fit these crystals, is used, first make sure that the outside diameter of the new crystal is exactly the same as the old crystal. Slight variations are unavoidable due to small tolerances in manufacturing.

Use a gauge to compare the diameter of the old crystal with the new one. If the new crystal is of the proper diameter and offers too much resistance in fitting, do not try to force it into the bezel. The inside ring which is split may be a little oversized. In this case, remove the ring from the crystal, open the ring slightly and, with a flat file, remove just a little metal. As little as 1/100 mm may be sufficient to allow the ring to be contracted enough to permit the crystal to be pressed in.

The sides of the crystal are cylindrical, not like the usual waterproof crystals. The bezel is constructed accordingly and the inside ring will insure the proper seal between crystal and bezel.

After fitting the crystal, the case and crown should be tested to make sure it is waterproof again.

industry News

Promotion plans for 'Watch Inspection Time'

■ THE BOARD OF Directors of the Watch Material Distributors Association of America, at their annual meeting in New York City in January, approved continued support of "Watch Inspection Time" in 1956 and 1957. Approval was given in answer to a special message sent to the directors by Paul A. Tschudin, director of The Watchmakers of Switzerland Information Center, Inc., in New York City.

Announcing the dates for the forthcoming promotions, Tschudin thanked the WMDA for their help and activities in making "Watch Inspection Time" a profitable promotion for watchmakers and jewelers throughout the United States. The appreciation of The Watchmakers of Switzerland was also expressed to the directors for their forward steps in establishing programs of importance and profit for the watchmaker at his bench.

"Watch Inspection Time" in 1956 takes place September 8-17. Promotional aids will be available. An expanded Spring campaign is scheduled for March 25-April 6, 1957, in answer to requests from state watchmaker associations and other horological groups. Comprehensive plans and discussions are under way.

In addition to support given the inspection campaigns by the WMDA, under the leadership of Edward Endman, president and Stanley House, executive director, other national organizations backing the events, as in past years, are the Horological Institute of America and the United Horological Association of America.

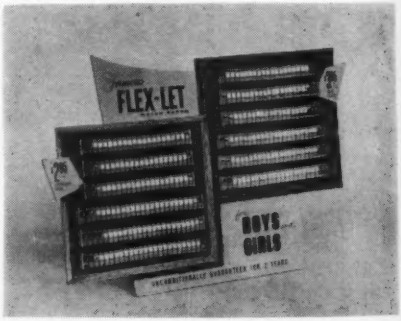
Horolovar makes free repair aid available

■ THE FEBRUARY, 1956, issue of the "Horolovar 400-Day Clock News" is devoted entirely to the eleven Suspension Units in current use by Kundo (Kieninger & Obergfell) 400-Day Clocks. The make-up and function of these different Units have often been confusing to repairmen. Until now, it's been almost impossible to tell which Suspension Unit goes with which model clock, and both Senior and Junior movements are involved. The availability of this "News" will be appreciated by the repair trade for its time-saving value.

A detailed explanation of all eleven Units is given. In addition, full size illustrations of each Unit serve as accurate guides for attaching the blocks and fork correctly to the suspension spring. Among other helpful information included is how to convert the Kundo Junior movement with "pin pallet" escapement to "Graham."

Cost of preparation and printing of this "News" has been absorbed by The Horolovar Company as a service to repairmen. Copies are available free. Request "Horolovar News No. 2" and send a stamped, addressed envelope to The Horolovar Company, Box 299A, Bronxville 8, New York.

Flex-Let's new guaranteed expansion bands



■ FLEX - LET CORPORATION, prominent manufacturer of men's and women's watch bands has just introduced a new expansion band especially designed for boys and girls.

Flex-Let's Boys and Girls bands retail at only $2.95 in stainless steel and $3.95 T.I. in 10K yellow gold filled.

An attractive multi-colored, easel back display shows one half dozen in white and one-half dozen in yellow in two size lengths.

This is the first time that a jeweler has had a boys and girls band that is unconditionally guaranteed for two years plus a repair guarantee for the life of the band.

The Flex-Let Boys and Girls Bands are available only in one dozen lots, six yellow, six white on the free display.

'Trade discounts' and the internal revenue department

THE INTERNAL REVENUE Service, in answer to a recent request, has advised that the coverage of the published ruling, Rev. Rul. 55-562, I.R.B. 1955-56, 17, regarding trade-in watches, applies to transactions where the allowance for any old watch is made on the basis of a percentage of the listed price of the new watches. The inquiry was made regarding a percentage allowance on contemplated sale of over 20 models of watches listed at various prices.

This new advice on the ruling permits certain flexibility of the "dollar amount" allowed, increasing as the price of the purchase increases.

In a sales promotion conducted in cooperation with the supplier of the watches, a retailer may offer a "trade-in" allowance based on a percentage of the listed prices of the new watches. Such allowance is considered a "trade discount" and is excluded from the tax base. The tax being applicable only on the net sale price.

As an example, if the "trade-in" allowance is 25 per cent of the listed price of the new watches:

Listed Price	Allowance	Net Price and Tax Base
25.00	6.25	18.75
50.00	12.50	37.50
100.00	25.00	75.00

The Jewelry Industry Tax Committee cautions that all other requirements of the ruling must be met before the allowance can be considered a trade discount and be deductable from the tax base. The principle requirements are:

1. Suppliers of the watches participate in the sales promotion program.

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17-Jwl. $5.00		15-Jwl. $6.00
10 Ass't. Used	WALTHAM & ELGIN	17-Jwl. $8.00
Swiss Watches, 7, 15, 17 Jewels, need cleaning only $20.00	16/0, 21/0, 18/0, 8/0, etc.	21-Jwl. $15.00 (18 size)
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	15-Jwl. $6.50	15-Jwl. $5.50
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2. A fixed amount is allowed for any old watch, or
3. A fixed percentage of the listed price of the new watches is allowed for any old watch.
4. The allowance is not determined by any process of bargaining.
5. The allowance made for the old watches bears no relationship to their values.

If watch "trade-in" transactions are made in the ordinary course of business and do not meet the requirements of the Internal Revenue Service ruling the amount of the allowance for the old watch is considered a payment on account and the full sale price of the purchase is taxable.

The advent of a large diamond manufacturer into the field of trading stamp promotion has raised the question of the applicability of the Federal Retail Excise Tax on transactions involving their use.

Bernard N. Burnstine, executive vice chairman of the Jewelry Industry Tax Committee, warns that allowances for such stamps cannot be considered a trade discount. The retail excise tax is applicable on the value of the stamps when redeemed on a taxable purchase. They should be treated the same as a cash payment on redemption.

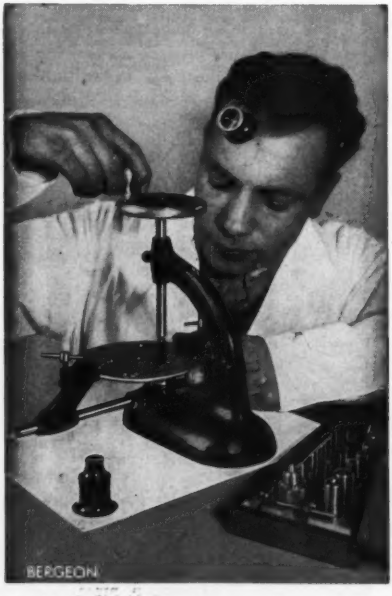
Internal Revenue Service, Regulations 51, 320.5 (d), states:

> "The giving of a premium in consideration of the return of wrappers, labels, coupons, trading stamps, or other scrip, delivered, or sold in connection with the sale of a commodity, constitutes a taxable transaction, and the person so giving the premium is considered to be the one who sells at retail."

This ruling has been supported by two court decisions.

Friction-held dial by Elgin

■ ELGIN, ILL.—A new friction-held dial, designed to simplify servicing by elim-



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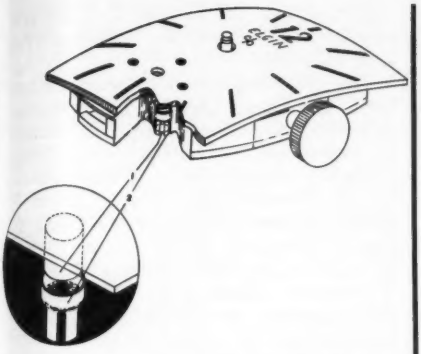

Figure one in picture above shows the dial foot as it looks on the new friction dial developed by Elgin. Figure two shows the Elgiloy spring clip which holds the dial foot in place.

inating foot screws, has been announced by Elgin National Watch Company.

W. M. Brandes, vice president in charge of manufacturing, said the new friction dial eliminates the necessity of unscrewing the dial foot screws before lifting the dial off.

With the new dial the watchmaker merely lifts the dial off. No special tools are needed; a piece of peg wood or an ordinary screw driver can be used.

The friction dial was made possible by development of a spring clip which holds the dial feet in place. This clip is made of Elgiloy and will not rust or freeze in position.

Formerly, dial foot screws were often lost during cleaning, or the threads were stripped if a watchmaker applied too much pressure. Also, moisture sometimes caused the screw to rust and freeze in the dial foot screw hole.

When the screw froze or was stripped an acid solution was needed to remove it from the hole.

The new friction dial completely does away with these problems.

The Elgiloy spring clip cannot rust or break, hence it will not freeze in the hole. Should it ever become necessary to lift the spring out, a watchmaker can do it easily with an ordinary staking tool.

Brandes, in making the announcement of the new development, said it will be put in standard use on all new Elgin movements for men's watches.

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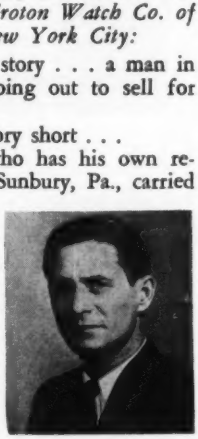
Gebhardt the jeweler, Gebhardt the salesman

Here is a news item, written with enthusiasm, from the Croton Watch Co. of 404 Fourth Ave., New York City:

Here's an unusual story . . . a man in the retail business going out to sell for another firm.

To make a long story short . . .

E. L. Gebhardt, who has his own retail jewelry store in Sunbury, Pa., carried several makes of watches in stock. One day along came the Croton salesman and sold him a few watches. Gebhardt sold a few Crotons . . . reordered . . . sold more . . . bought more . . . sold more and more and bought more and more. He became convinced that Croton was a fine watch to sell . . . good quality . . . good mark-up . . . clean merchandise . . . few returns . . . few repairs . . . less headache.



Some months passed and Gebhardt became excited about Croton watches; he wore one himself; he convinced the consumer; the consumers became his lifelong friends. Some more months passed and Gebhardt felt more profoundly that more jewelers should know about such wonderful values.

So Gebhardt came to New York, straight to the Croton office . . . asked for the line . . . Croton was convinced.

With his wife and brother taking care of his store, Gebhardt is now "hitting the road" with the Croton line and winning many friends along the way.

Today Gebhardt is a very happy salesman.

Jewelers board meets

■ THE ANNUAL MEETING of the members of The Jewelers Board of Trade was held January 27, 1956, at the offices of the Association, 413 Turks Head Building, Providence, Rhode Island.

Lester S. Wall, president, presided and gave an interesting talk on the Association's activities throughout 1955.

The reports of Vincent F. Chapman, secretary, and Horace M. Peck, treasurer, were submitted.

The following directors were elected: Jared E. Allen, Oneida, Ltd.; Gottlob Armbrust, Armbrust Chain Co.; Charles G. Brown, Stein & Ellbogen Co.; George J. Kelley, Swank, Inc.; William Klein, Jacques Kreisler Mfg. Corp.; Lester F. Morse, Gorham Company; William B. Ogush, Diamond Watch Corp.; Edson W. Sawyer, Improved Seamless Wire Co.; W. Waters Schwab, J. R. Wood & Sons, Inc.; Raymond L. Wells, Wells Manufacturing Co.

Swiss timers used for 1956 Olympic Games

■ DAILY ASSAULTS ON speed records, beginning with Roger Bannister's epochal mile in under four minutes, have placed incredible demands on the timing industry. Performances on land, sea and in the air, have been so startling that sight has been lost of the importance of the super-accurate devices without which no "record" would be beyond dispute.

Twenty years ago the official timer of the Swiss Auto Club—an authority on the subject—stated that even the best of the observatory tested timers could be "appallingly irregular." Many people are eager to contest new speed records; however, no one has questioned the accuracy of present-day Swiss timing devices always used in big sports events.

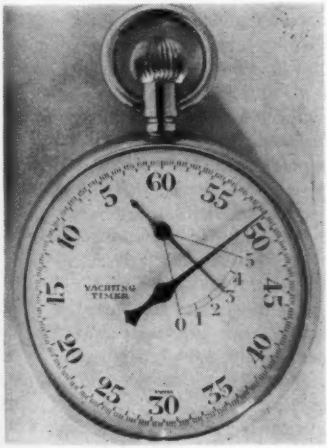
Avery Brundage, president of the International Olympic Committee, recently stated: "Sportsmen can thank the watch industry for eliminating human errors in timing so that the elapsed time of races can be measured to 1/100th, or even 1/1000th, of a second. One can hardly realize the great difference that would result in most sports if there were no watches. The Olympic Games are much more interesting because of this precision of timing and the continuity that comes with the possibility of comparison with the past.

Modern sports-timing methods date back to 1862 when a Swiss, Adolphe Nicole, invented the first chronograph with a "fly-back" hand. Since then Swiss

watchmakers and technicians have spared no effort to pare to zero the possible margin of error allowed by the chronograph and the short-duration, 60-second maximum chronoscope timers. The large sweep-second hand of the chronograph moving forward in 1/5 or 1/10-second intervals must be perfectly synchronized with a balance vibrating exactly 300 times a minute, the hand making one complete revolution a minute for 1/5 second timing, two for 1/10th second.

Not long ago, when sports timers were hand held, arguments over timing were common to sports events. The possibility of human error was first eliminated at horse-racing tracks by stringing a shoulder-high silk thread at the starting and finishing posts. The broken thread would activate an electro-magnetic contact that started and stopped a series of chronometers set up in an electrically-controlled timing box. This system proved to be ideal also for foot races and ski events.

Automobile races ordinarily are timed by a small water-filled rubber tube stretched across the track. The front wheels of the racing car, passing over the tube, activate a piston which starts or stops a bank of timers. This device has



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become so perfected that passage of the rear wheels over the tube has no effect.

Interval timers, adapted for boxing, wrestling, football, basketball, hockey, and other games, are limited only by the number of applications possible. There is a specialized Swiss timer for every imaginable sport.

Timers required for recording to the nearest hundredth of a second are now being produced in Switzerland after years of careful research. They require first a movement, basically similar to that found in any fine Swiss watch, capable of almost perfect accuracy. Such a mechanism does not gain or lose more than .01 second daily, of the 432,000 seconds ticked off by a watch every 24 hours.

When hundredth-of-a-second timing is required, the conventional balance is replaced by an electrically-activated quartz crystal that produces 100,000 vibrations per second with absolute regularity. This figure is reduced to 100 cycles per second by electronic frequency dividers, with a series of counters (indicating the time in hours, minutes, seconds, tenths and hundreths of a second) operating from an axis turning at this rate.

Starting and finishing times are automatically printed on tape, eliminating the possibility of reading error and giving permanent evidence of the setting of new records. Most of these timers are activated by a photo-electric beam.

The most complex of these devices makes possible to record, simultaneously, the times of 18 competitors, even if the distance between the first and the last is less than a second, printing all results on tape. Another similar apparatus produces the same kind of tape photographically-ready four seconds after the finish, and a third actually photographs the winners at the finish line on a film divided into sections representing hundredths of a second.

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Automation 'not so new' says Elgin scientist

■ AUTOMATION? "It's not as new as we are often led to believe," a group of industrialists were told last month at a seminar on the subject at Illinois Institute of Technology.

"There is a growing tendency—and a dangerous one, to conceive of 'automation' as a science that has suddenly burst upon us full blown since World War II, and which has within it the power to solve all industry's production problems," said George Ensign, director of research at Elgin National Watch Company.

Speaking to some 200 industrialists, engineers, and automation-minded scientists, Ensign said:

"We approach what we fancy to be 'frontiers' of science with the bravado and high anticipation of a pioneer, but so often we cross the frontier to find someone has been there before."

He pointed out a device in his own industry, a machine that was developed in 1904 to recess, drill, countersink, tap and finish 50 holes in the base plate for a pocket watch—automatically.

"We found it impractical since free machining alloys and tools capable of long production run per sharpening had not yet been developed," Ensign said.

"Fifty years later we see the automobile industry automatically machining engine blocks, similar to our plate making of 1904 and that this is automation," Ensign said.

"I do not belittle 'automation,' in fact I will argue that it holds a very bright promise for tomorrow," he added.

"But I do feel we are deluding ourselves if we emphasize automation to the

neglect of old fashioned, sound engineering approaches to our production problems," he said.

"It's time we step back a little and take another look at 'automation'—that we start viewing it not as the revolution that it is usually conceived to be, but rather an evolution, simply a refinement and improvement of production methods that have been developing slowly but surely since the onset of the Industrial Revolution," Ensign said.

Hamilton Watch Co. enters high precision gage field

■ THE HAMILTON WATCH Company of Lancaster, Pennsylvania, continuing its long range diversification program, is entering the high precision gage field, it was announced by Arthur B. Sinkler, Hamilton president.

Mr. Sinkler stated that Hamilton had acquired all rights to manufacture and distribute Kwik-Chek gages, which were developed about a year ago, and produced until now by the New Standard Corporation of Mt. Joy, Pa. The Allied Products Division of Hamilton will begin to manufacture these gages early in February and will schedule deliveries for March. The trade name Kwik-Chek will be retained.

These gages, available in three sizes, sold individually or in sets, measure the interior diameter of round holes by utilizing a sliding shaft and precision locking device that permits fast and precise readings—accurate to the nearest half thousandth of an inch. Prior to the development of these gages, measurements were extremely time consuming and required expensive equipment.

The acquisition of Kwik-Chek is another step in Hamilton's diversification program which is expected to grow steadily, according to Mr. Sinkler. Early in 1955, Hamilton acquired the Hathaway Instrument Company of Denver, Colorado, manufacturers of electronic products, including measuring and recording devices. The Allied Products Division was established in Lancaster in 1953. In 1951 Hamilton purchased the Ralph W. Biggs Company of Stamford, Connecticut, manufacturers of watch cases.

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Watchmakers of Switzerland set important promotion dates

THREE jewelry store watch sales and service promotions have been scheduled by The Watchmakers of Switzerland after consultation with leaders of the jewelry and horological industry.

The events — "Watch Parade" and "Watch Inspection Time"—will be continued in 1956 and 1957, because of their success as traffic and sales boosters in 1955 and previous years, according to Paul A. Tschudin, director of The Watchmakers of Switzerland Information Center, Inc., in New York.

"Watch Parade" will take place this year October 8-20. "Watch Inspection Time" this Fall is scheduled for September 8-17, with a new and expanded Spring campaign for Inspection Time from March 25 to April 6, 1957.

Promotional materials, as in the past, will be made available, Tschudin stated, to help jewelers and watchmakers profit further from these tested national campaigns. "The 'Watch Parade' is the type of promotion continually requested by jewelers to back up their over-the-counter sales efforts," Tschudin added. "With national advertising and publicity focused on an event taking place in jewelry stores throughout the country, the local jeweler then has the added opportunity to aggressively promote his wide range of modern Swiss jeweled-lever timepieces as self-winders, calendars, alarms, chronographs . . . and other special-purpose watches made especially for today's—and tomorrow's—living.

" 'Watch Inspection Time,' the national campaign for watchmakers and their service departments, is an effective promotional lever on the service side of the store operation. It has proven to be one of the leading traffic-and sales-builders for alert, promotionally-minded stores, because once a consumer brings in a timepiece for inspection or servicing he immediately becomes a customer for one or more of the many fine products on sale in the modern jewelry store."

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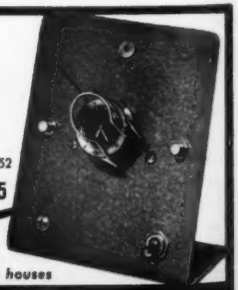

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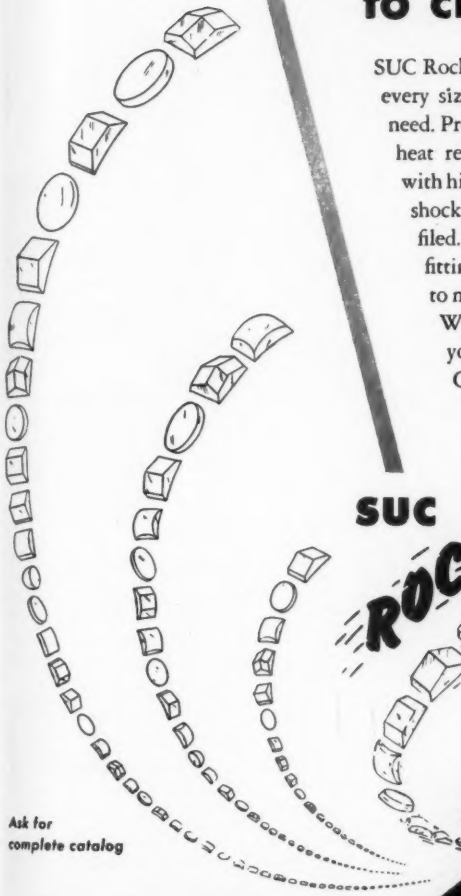

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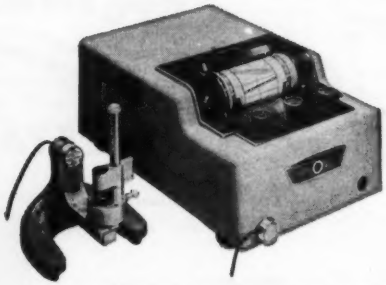

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